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The AUTOMOBILE

World's Greatest Racing Car

Description of Peugeot Racer, Victor at Dieppe, Le Mans, Mont Ventoux and Boulogne—Photographic Reproductions Disclosing Details of Design and Construction—Most Consistent Speed Creation Yet Produced

WITH Dieppe, Le Mans, Mont Ventoux and Boulogne as evidence, the Peugeot racer is undoubtedly the finest pure speed production France has ever possessed. Built under no-limitation regulations, the car is distinctive as a specimen of the light-weight, high-efficiency type developed of recent years in Europe. Its four cylinders measure 4.3 by 7.8 inches, bore and stroke, from which it has been possible to get 175 horsepower on bench tests; the maximum speed of the car is about 120 miles an hour; its total weight empty is 2,000 pounds; and although shaft-driven, it holds to the road better than the majority of chain-driven racers. The car is largely the production of Georges Boillot, the Peugeot race driver, and his companions, Goux and Zuccarelli. With their experience in light car races, they determined the distinctive features of the big car and were responsible for many of the interesting details which go far toward the making or the marring of a speed production. Shaft drive was decided on after lengthy experience with both types of final drive, Peugeot having at first been a partisan of side chains for racing, and later coming over to the propeller shaft for all models.

The importance of restricted weight and perfect adherence to the road were manifest at the Dieppe Grand Prix. It was undoubtedly owing to the lower tire consumption consequent on the lower weight that the car with one-half the cylinder area was able to beat the Fiats in this long-distance event. At maximum speeds the Peugeot appeared to

Fig. 1—Peugeot racer, Europe's fleetest speed production, which has swept the boards during the present season in long-distance road races, speed trials and hill-climbs. The machine, the development of racing engineers, is a light-weight, medium-powered creation, weighing under 2,000 pounds and with four cylinders 4.3-inch bore and 7.8-inch stroke, much smaller piston displacement than cars it has outdistanced. On road straightaways it has proven to be speedier than any cars entered in contests this year

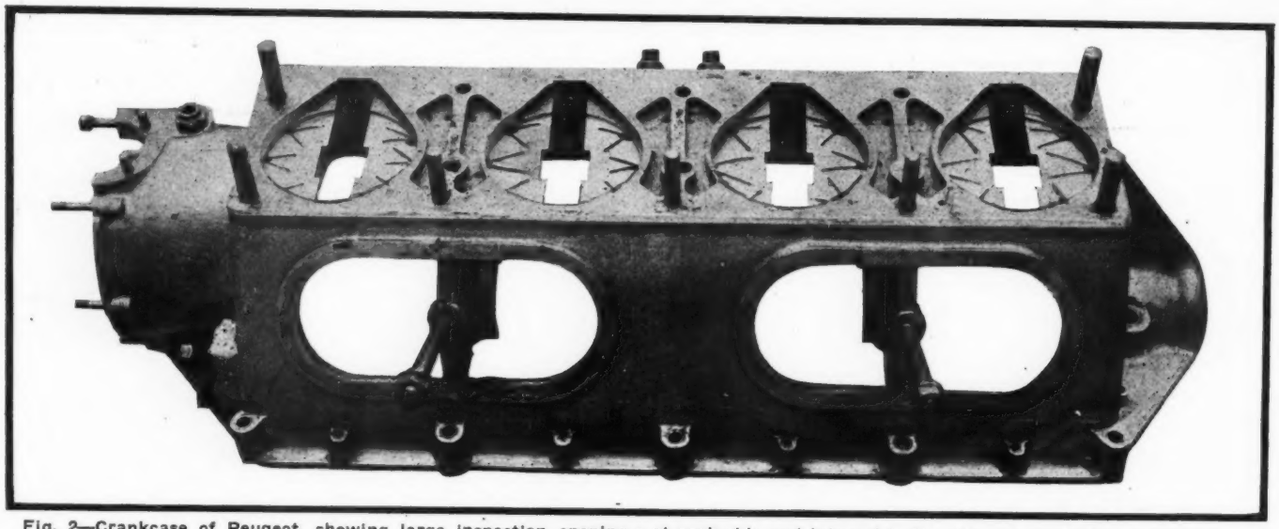
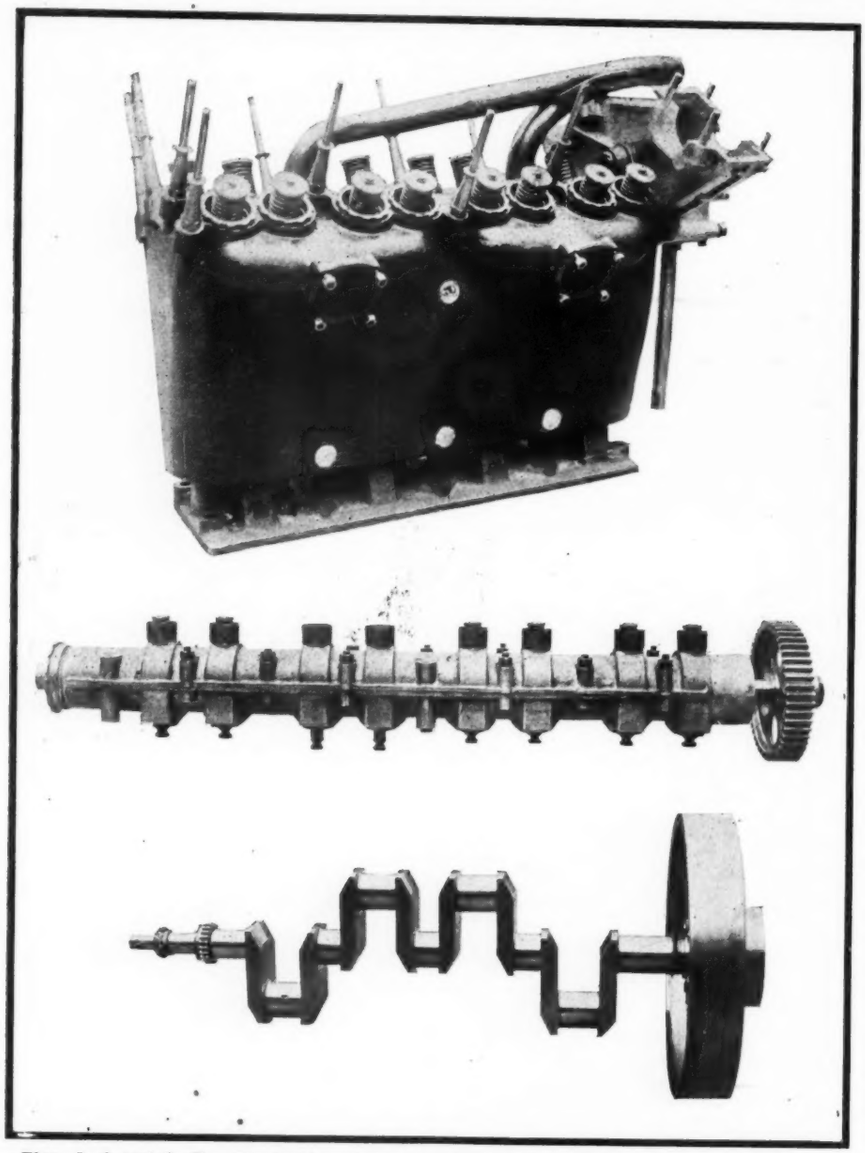


Fig. 2—Crankcase of Peugeot, showing large inspection openings at each side and integral baffle plates to partially close open ends of cylinders to prevent an excess of oil reaching them



Figs. 3, 4 and 5—Top illustration shows the block four-cylinder casting with both camshaft housings removed. Middle illustration shows one of the camshafts removed with its housing. Bottom illustration shows conventional crankshaft

stick to the road better, and was probably easier to handle than Bruce-Brown's Fiat, although it would be impossible to offer much criticism of the Fiats on this.

A study of the accompanying tables will show the speed in the long races in the last few years. The French Grand Prix is of special interest in considering the Peugeot racing car. The average speed attained by this racer over the 478.4 mile course was 72 miles an hour.

The entire Peugeot power plant is carried on a three-point suspended subframe having the form of an elongated U, the curve being at the fore end and having a central trunnion attachment to a very substantial double cross-frame member. Both this and the two rear ball-and-socket attachments are provided with lubricators, the object of the design being to free the power plant from all the twisting straining of the main frame members. The frame members themselves have not much that is distinctive; they have an upward curve in order to clear the back axle; the chassis is carried on very broad flat springs, and two stout leather bands encircle the rear axle and the rear transverse frame member in order to eliminate violent action of the springs.

The motor has its cylinders in one casting, is attached to the crank chamber by five bolts a side, and has its valves inclined in the head at an angle of 45 degrees. There are four valves per cylinder, their diameter being 2.36 inches and their lift .43 inches. The normal speed of the motor is 2,200 revolutions, which gives a piston speed of 2,860 feet per minute. The valve design is a Peugeot patent, for, although the inclined position of the valves is not unusual, the method of operating them by means of independent overhead camshafts is altogether original. This position gives a hemispherical combustion chamber and allows the placing of the

spark plug, one per cylinder, directly in the head. Each camshaft, with its push rods and recall springs, is complete in an aluminum housing placed sufficiently high above the head of the cylinder to isolate it from the heat of this latter, and is carried on a series of seven long projecting bolts. The drive is obtained by a vertical spindle at the fore end of the motor and enclosed gearing at the upper front end of the engine to the spur pinions on the end of each camshaft. Profiting by racing experience, the design of the valve is such that in case of a breakage it is impossible for the head to drop onto the piston. The camshafts, complete with their housing and pinion, are mounted over the respective range of valve stems and can be lifted away by removing a series of seven nuts. The exact nature of the valve operating mechanism has not been revealed. Each camshaft naturally carries eight cams operating within the interior of an eccentric having a push rod without roller forming an integral part with the eccentric. The tappets have adjustable heads and are recalled by light coil springs on the top of the camshaft housing.

The crankshaft is carried on five plain bearings, is of BND chrome nickel steel and is bored throughout for lubrication under an exceptionally high pressure. Steel pistons are used with hollow connecting rods, the weight of the reciprocating parts being kept as low as possible, the complete piston, with rings and wrist pin, weighing only 32 ounces. The wrist pin is fixed in the connecting rod and is carried in bronze sleeves within the piston. The crank chamber, divided horizontally into two portions and having the crankshaft carried in the lower portion, is provided with two large hand holes on each side for an inspection of the connecting rod ends. The space between the top of the crank chamber and the base of the cylinder is filled up with the exception of the space necessary for the passage of the

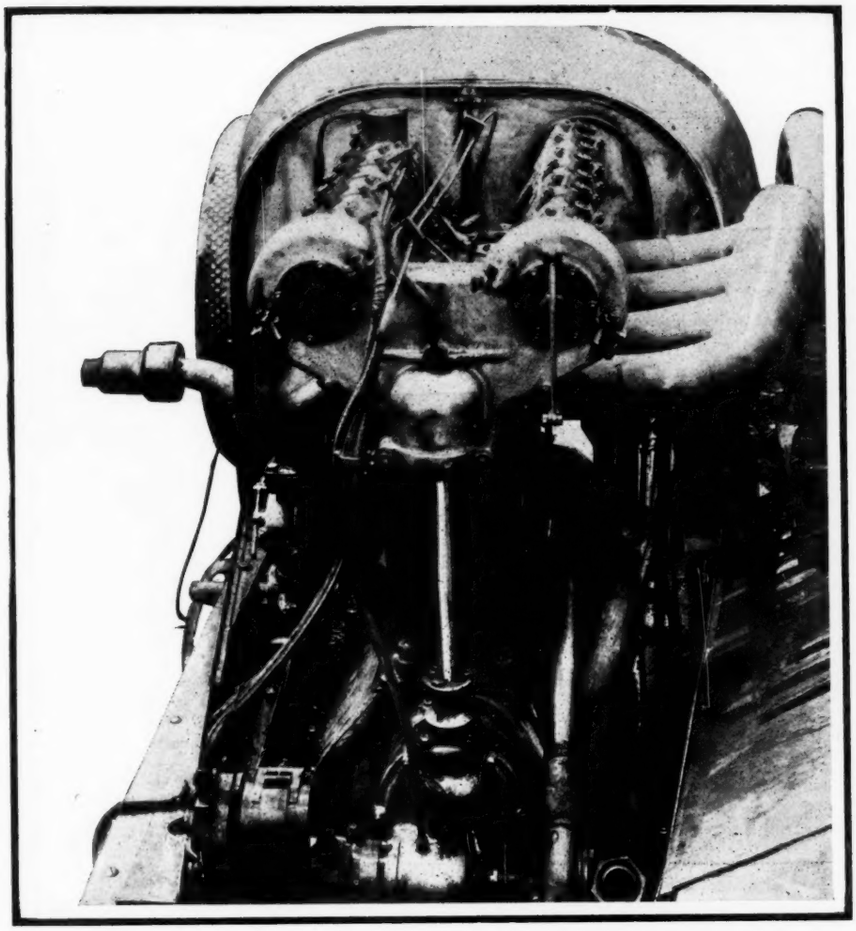


Fig. 6—Seven-eighths front view of the four-cylinder Peugeot racing motor

FASTEST TIMES UP TO 1912

Year	Race	Distance miles	Car	Speed miles per hour
1906	Vanderbilt	297.1	Darracq	61
1907	Grand Prix	478.4	Fiat	70.61
1908	Grand Prix	478.1	Mercedes	69.24
1909	Santa Monica	202	National	74.62
1910	Santa Monica	202	Lozier	71.31
1911	American Grand Prize	411.36	Fiat	74.45

RACE: FRENCH GRAND PRIX

Year	Winning car	Distance	Time	Bore and stroke	Average speed miles per hour
1906	Renault	750	12:14:07	.....	60.8
1907	Fiat	478.4	6:46:33	180 x 160 mm.	70.61
1908	Mercedes	478.1	6:55:43	6.6 x 7 inches	69.24
1911	Fiat	420	7:06:30	5.11x7.45 "	56.54

RACE: VANDERBILT CUP

Year	Car winning	Distance miles	Time	Bore and stroke	Average speed miles per hour
1906	Darracq	297.10	4:50:10	7¼ x 6	61
1908	Locomobile	257.98	4:00:48.2	7¼ x 6¼	64.5
1909	Alco	278.08	4:25:42	4.72x 5.51	63
1910	Alco	278.08	4:15:58	4.75x 5.5	65.5
1911	Lozier	291.38	3:56:57	5⅜ x 6	72

RACE: AMERICAN GRAND PRIZE

1908	Fiat	402	6:10:31	4.52x 6.49	65.11
1910	Benz	415.2	5:53:05	6.1 x 7.87	70.28
1911	Fiat	411.36	3:31:29.13	5.9 x 7.87	74.45

RACE: LOWELL

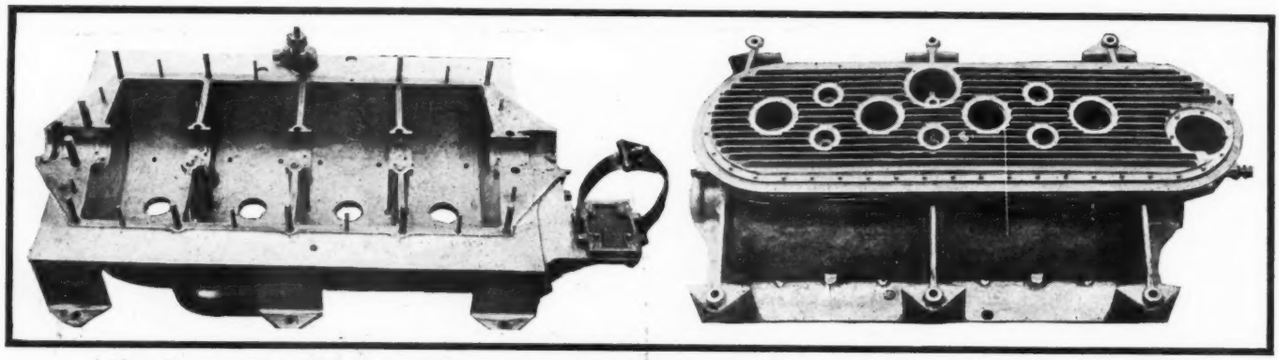
1908	Isotta	254.4	4:42:34	5.87x 5.5	53.6
1909	Buick	212	3:49:08	4.5 x 5	56.6

RACE: FAIRMOUNT PARK

1908	Locomobile	200	4:02:30	5 x 6	50
1909	Simplex	200	3:38:54.8	6.1 x 5 75	55.4
1910	Chadwick	200	3:29:07.8	5 x 6	58.1
1911	Benz	200	3:18:41	6.1 x 6.2	61.25

RACE: SANTA MONICA

1909	National	202	2:42·27.6	5 x 5 11/16	74.62
1910	Lozier	202	2:49;59	5¾ x 5⅜	71.31
1910	Lozier (stock race)	151.5	2·04:10.8	5⅜ x 5⅜	73.22



Figs. 7 and 8—The middle portion of the crankcase showing it in its correct position and, at the right, upside down

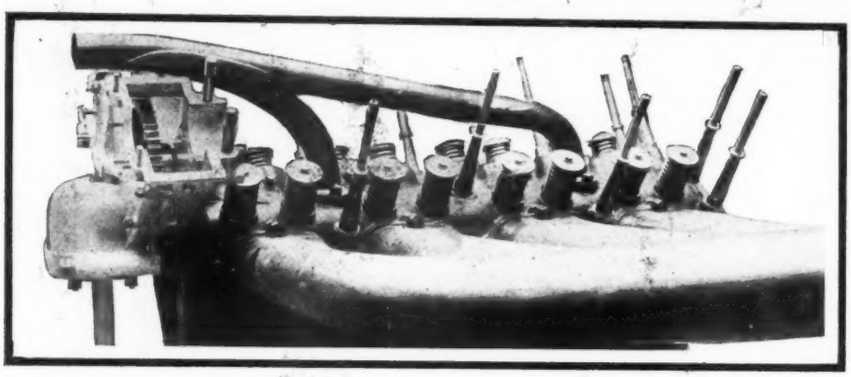


Fig. 9—Top of cylinder casting, showing studs to anchor camshaft housings

connecting rod, and in this guard plate a series of holes is drilled to allow of the return of the oil swept from the cylinder walls into the base chamber. The lower portion forming oil tank is deeply ribbed to assist in cooling the oil. A constant level is maintained, and if this level should be exceeded a hand pump allows the mechanic to draw the excess out of the motor to the reserve tank. A gear pump carried within a cylindrical housing and having a cone seating draws the oil from the base chamber, delivers it to the main bearings through the hollow crankshaft to the connecting rod ends, and up the tubular connecting rods to the wrist pins. All the oil leads are internal and are steel tubes brazed in the crank chamber, special care having been necessary to prevent leakage owing to the unusually high oil pressure maintained. The camshafts are fed by a hand pump, with an overflow to the base chamber. A downward extension of the vertical spindle driving the timing gears operates the oil pump, and the Bosch high-tension magneto and the water pump are driven from the respective extremities of a transverse shaft. During all its races the car was fitted with a new type of Claudel carbureter.

A multiple-disk clutch takes the drive from the motor to the four-speed gearbox, this latter, as already explained, being mounted on the subframe. The gearbox is a compact structure with the two shafts carried in a horizontal plane and having the selector within the box, instead of being on the outside of the frame members, as is usual. Fig. 11 shows it is absolutely protected from dust, there being nothing external but the change speed lever. The arrangement of the three sliding sets of gears is not that usually adopted; the first one gives the first and reverse speeds; the second the second and third speeds, and the fourth direct drive by means of a dog clutch. At a motor speed of 2,200 revolutions a minute, the ratios give a car speed of 55, 74, 99 and 112 miles an hour. Both primary and secondary shafts are bored out in order to obtain a reduction of weight.

The propeller shaft has a universal joint at each extremity, these joints being carried on ball bearings. A floating rear axle is employed with a vertically divided differential housing of aluminum. This rear axle is a remarkably light construction, and in order to reduce weight

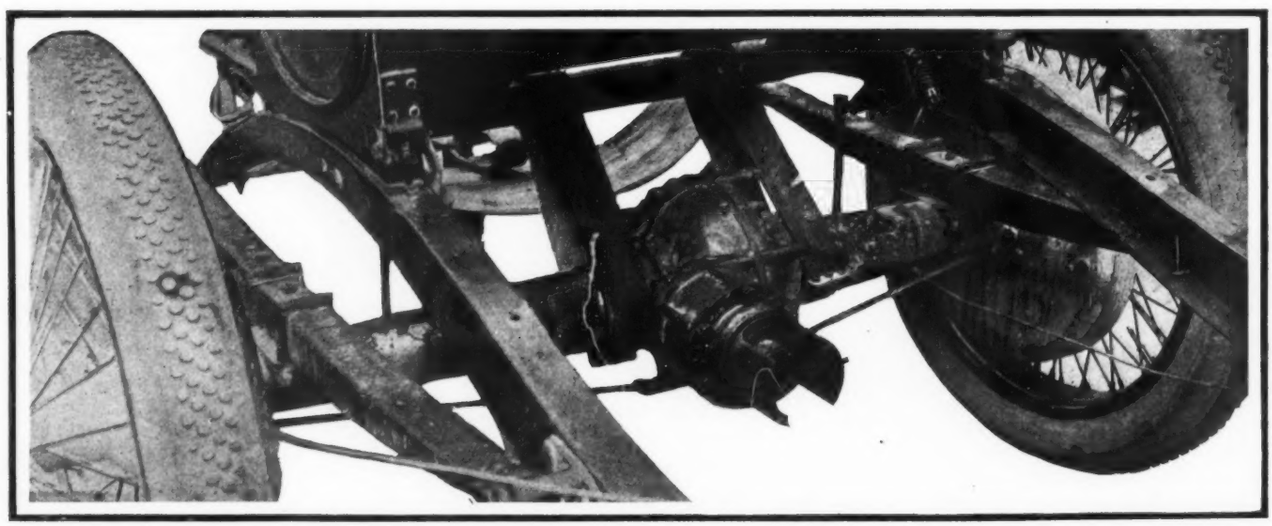


Fig. 10—Rear axle details of the Peugeot and mounting of gasoline tank. Springs are specially flat and frame is upswept over the axle

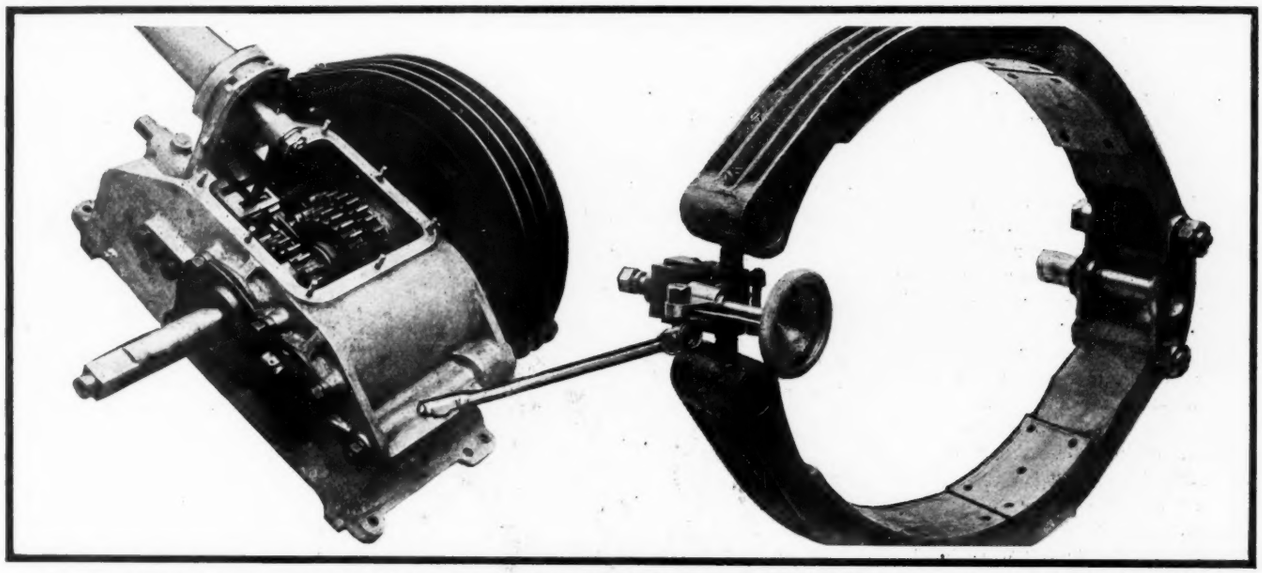


Fig. 11—Peugeot gearbox and brake, the former with its entire selective mechanism inclosed. All parts are protected from stones

even the cover of the bevel pinion housing and the jaws of the universal have been drilled (Fig. 14). Very large diameter ribbed brake drums are fitted, the operation of the rear wheel brakes being by hand lever with steel cable connection. There are neither radius nor torsion rods, all the effort being transmitted through the rear springs. The foot brake, also of the ribbed type (Fig. 11), encircles a broad-faced big diameter drum at the rear of the gearbox. The two shoes are united by a vertical screw having rapid right and left hand threads cut on it, it thus being merely necessary to turn this screw in either one direction or the other in order to separate or bring together the two shoes. Provision is made for very rapid regulating of the brakes; the hand brakes can be regulated through a trap in the footboards while the car is in motion.

No attempt whatever has been made to adopt a stream line body. The bonnet is narrowed in somewhat at the front, thus reducing the width of the plane surface radiator, but there is no other attempt at wind cutting. The gasoline tank is carried transversely across the frame behind the driver's seat and the two spare wire wheels are to the rear of the tank. Generally the car is run with 815 by 105 millimeter front tires with 880 by 120 tires at the rear.

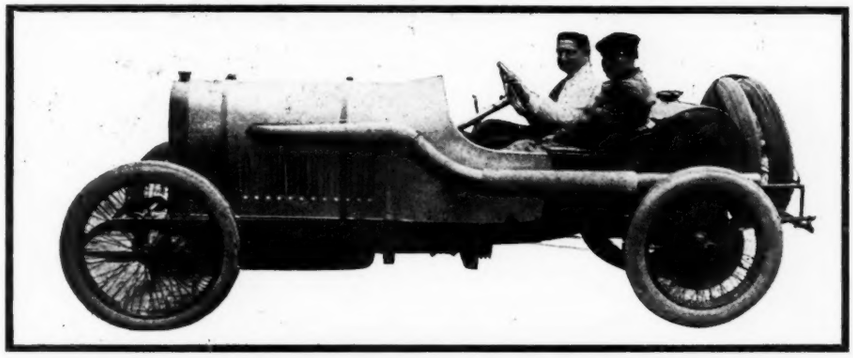
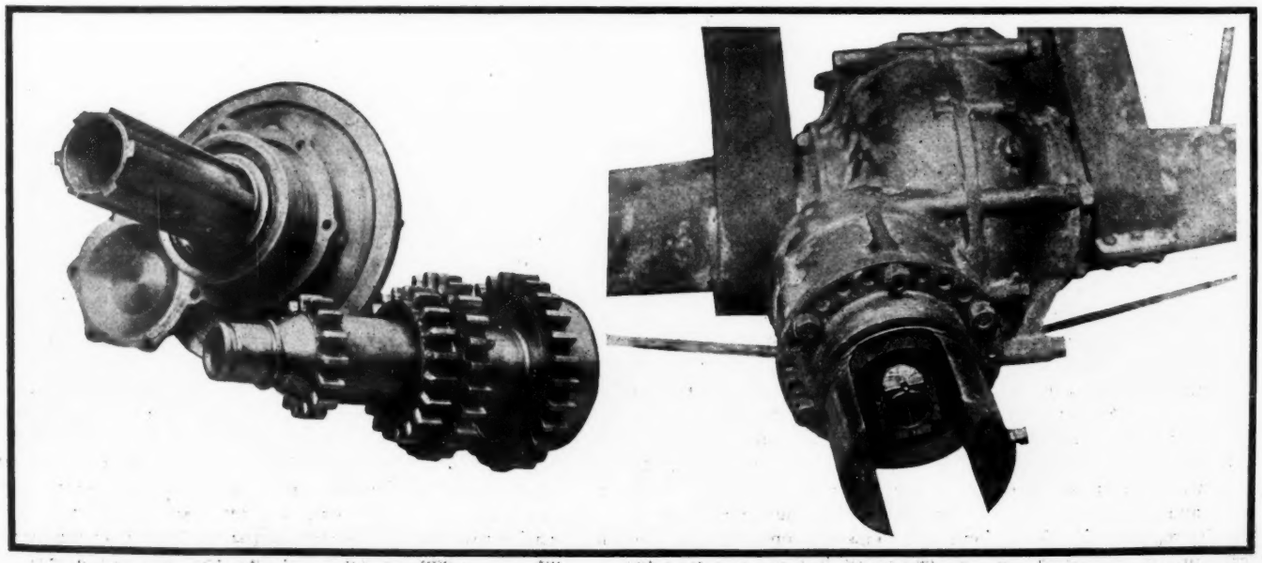


Fig. 12—Left side of Peugeot racer, showing how exhaust manifold is carried



Figs. 13 and 14—Main and countershafts. At right, rear universal joint attachment, showing perforations to reduce weight

Stealing World's Greatest Industry

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Imperial Commissioner from Ceylon Predicts Wider Use for Product of the Plantations

RUBBER production has superseded tea, coffee and sugar as major crops in Ceylon and Malaya and stands second to coffee among the Brazilian agricultural activities. F. Crosbie Roles, Imperial Commissioner to the International Rubber Exposition from Ceylon, and considered one of the highest authorities of the world on the subject of cultivate rubber, says that the industry as a whole is only at the beginning of its day. He predicts that 2 shillings a pound will be the prevailing price of pure gum rubber within calculable time and that at that price the planters will net a comfortable profit. From his viewpoint, he can see a gradual limitation of the indigenous production as the level of prices comes down, cutting off the rubber growing in the most remote districts first and gradually tightening the territorial lines until the only wild rubber that will be able to compete with that of the plantations will be that which costs so little to produce that it can be sold at a profit on the same general level of prices as the cultivated rubber.

In discussing the industry and its prospects Mr. Roles gave this exclusive statement to THE AUTOMOBILE:

"Plantation rubber, which will have a commercial production this year of about 20,000 tons, worth about $50,000,000 in your money, ranks first in the history of mankind for the rapidity with which it has taken its place as a factor in agriculture.

"There is no record in history where any other agricultural element became an important wheel in the vehicle of commerce in so short a time. Only about 37 years ago H. A. Wickham, under orders from the Marquis of Salisbury, succeeded in shipping a boat load of rubber seed from Brazil. Brazil, naturally wished to retain its practical monopoly on the production of the *hevea brasiliensis* tree from which is obtained the crude rubber that sells at the highest levels in the markets of the world. The Brazilians had a very strict penal statute against exportation of the seed and Commissioner Wickham was instructed to get possession of some of it for introduction into the Asiatic possessions of the British Empire.

"After a series of wild adventures, Wickham managed to get out of the country with a boat load, numbering 70,000 seeds. It was well known that the seed of the hevea is exceedingly delicate and that even moderate ranges of temperature will serve to destroy its life. Therefore, Wickham observed all possible care in smuggling out the seed to protect it from exposure to the weather. Despite all this care only a small proportion of the seed germinated when planted in the Kew Gardens. All told 2,000 seeds retained enough of the vital principle to sprout, and from these seedlings the great plantation industry of the East has sprung.

He Acted Under Orders

H. A. Wickham, who, on instructions of the Marquis of Salisbury shipped the rubber seeds from Brazil which formed the basis for the cultivated rubber industry of the Mid-East

"I do not mean to say that there never was any other rubber produced in the East except from these seedlings, because even today the production of low-grade rubber from a variety of trees, shrubs and vines is an important element in the industry. India, Borneo and the Malay peninsula grow large quantities of rubber from plants that have been known and exploited to some extent for centuries.

"But such elements are not included in the broad generic term plantation rubber.

"A brief outline of the various steps required to place rubber on the market may be described as follows: Plantations are usually about 3 square miles in extent, but may be either larger or smaller. The land selected for the active production of rubber is first cleared of jungle and underbrush. This is accomplished by burning over the land, or by some other method of clearing it. Latterly there has been a sharp question raised about the value of the burning method. It has been shown that there is more wind in Ceylon than in the Amazon valley and that after the clearing fire has done its work the air currents are very likely to whisk the ashes from the ground and deposit them in the nearest watercourse. Thus a large element of potash and nitrogen is lost to the land. Conservation engineers also point out that where land is denuded of its covering and where heavy rains mark some season of the year, there is great danger that exposed soil will be washed away and lost.

"But the use of fire is cheap and effective in clearing and if conditions are right rich soil of the tropics is soon covered with vegetation carpeting the ground in which the rubber trees stand. The hevea is not a very sturdy growth and excessive wind proves destructive.

"The planting is done with hand drills and the plantation is laid out in conventional form, the trees being placed in rows at regular distances. There is some difference of opinion as to the correct interval to be allowed between the rows and the trees in the row. Ordinarily there will be about fourteen rows of fourteen trees to the acre, or about 200 trees to the acre. This varies with the idea of the company as to the correct number to put out. Some experts favor less than 100 trees to the acre and

some hold that 500 is not too large an amount to plant. The general average is probably about the figure I have indicated.

"The little trees are delicate and require care to bring them to maturity. In a carefully prepared and fertilized soil their growth is rapid. Noxious growths must be eliminated with the hoe or harrow and the surface of the earth must be protected as quickly as possible from the baking of the sun and the action of the elements. There are many expedients used by the planters to accomplish these ends, chief among which are the planting of catch crops between the rows, the introduction of certain types of vegetable growths that will crowd out the noxious weeds and by careful cultivation of the plants themselves.

"Take the case of a typical planter who has cleared and planted 2,000 acres of land. At the end of 1 year he will have 400,000 young trees, minus an uncertain proportion of initial losses. This proportion varies in response to numerous factors, some of which have been outlined above.

"Where the seedlings have failed, they are replaced as promptly as possible, for it has been shown that immature latex produces rubber less strong than that derived from mature trees, but more particularly because the mixture of the latices of immature trees with those of more fully developed plants results in a lack of uniformity of the marketed rubber. Thus it is important to use latex from trees of similar age in the manufacture of rubber of a standard grade.

"The time for tapping is reached when the trees are large enough. The rule has been that the tree should be 18 inches in circumference, 3 feet from the ground, before tapping is begun. This is usually some time after the end of the fourth year.

"The tools used in tapping are simple, almost primitive. Chief among these implements is a long, heavy, curved knife. The tapper, following the particular set of rules in force on the specific plantation, cuts into the bark of the young trees, first making a main channed down the trunk to carry the flow of latex. He leads into this channel a series of parallel, slanting cuts, so that the juice can flow by gravity. The utmost care is used to avoid cutting into the body of the tree and at the same time the cuts must be deep enough to reach the arteries that carry the latex.

"The cup placed at the bottom of the perpendicular channel is usually made of tin, but in many cases it is enameled inside and out.

"The flow of milk continues for only a short time, ceasing when the sun grows hot. The collectors move along the rows of trees after the daily flow has ended and dump the contents of the cups into pails that they carry. Having collected the milk from a certain section, the laborer pours his milk into a tank-wagon, drawn by man or animal power, which covers his section of the plantation. There may be one of these tank-wagons for each block of 5, 10 or more acres. Of course, all the trees in a plantation are not tapped the same day, the work being arranged so that every division receives regular attention at regular intervals during the tapping season.

"The tank-wagons proceed to the plantation factory, where their contents are run into vats. The main idea of the vats is to have them arranged so as to protect the latex as much as possible from the oxidizing influence of the air as well as extraneous matter.

"The process of coagulation is achieved by putting a certain amount of acetic acid into the vats. This causes the thick part of the rubber milk to rise and leaves a yelow serum at the bottom of the tank. The more advanced planters are now working on an efficiency plan to save a lot of labor in the process of coagulation. The latex consists of practically two-thirds serum, which is valueless at this time. Still it requires twice as much carrying power to bring it to the central station in its original form as is needed to carry the valuable part of the latex.

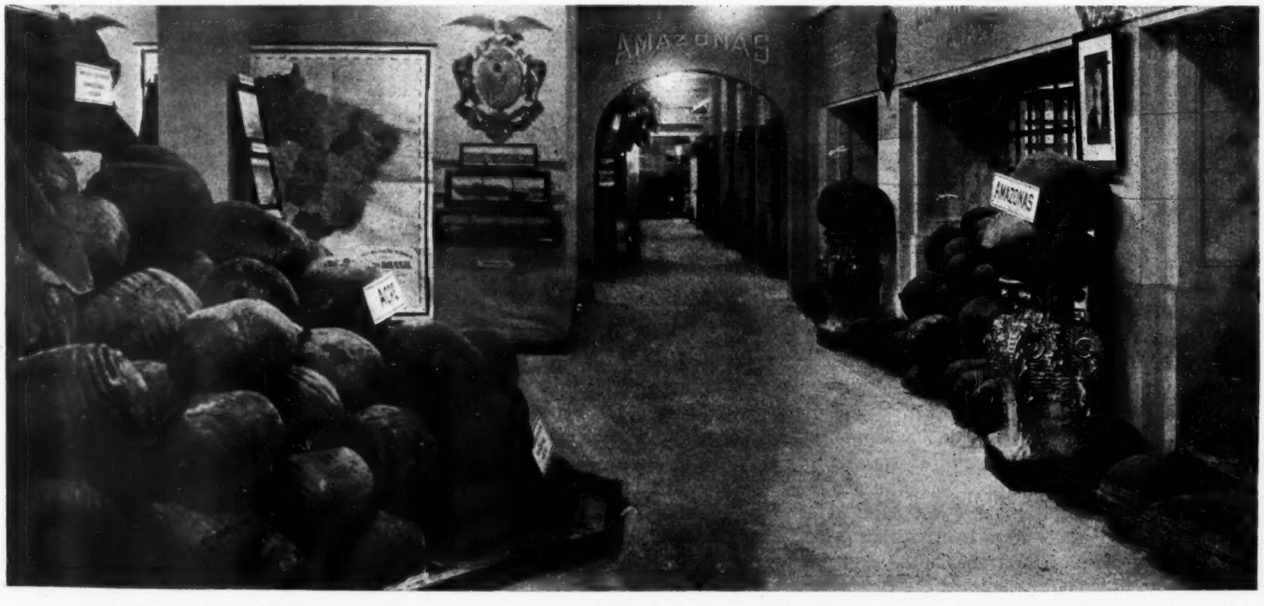
"The plan I refer to is one which contemplates the separation of the serum from the solid part of the milk right on the ground. But no matter how this question is settled eventually, the main idea of preparation for market is the same in any event.

"When the serum is separated, it is run off and the solid, cheeselike rubber is left. This is subjected to manipulation to remove as much of the serum as possible before subjecting the product to the roller machines.

"These machines are of two general types. First, is the machine which has two cylinders of equal size, geared to run in opposite directions on fixed axles. The rollers turn toward one another and are placed so that their surfaces come within a small distance of touching. The white rubber is run through these rollers until it is fairly free from water and when it emerges it is in the form of rubber known as Ceylon sheets.

"The other type of machine has its cylinders geared at different speeds and one of them is corrugated so that when the rubber is run through it comes out either stamped with a regular pattern or wrinkled, in the conventional form known as crepe.

"This crepe is hung in storehouses to dry out without smoking if it is to be marketed under the trade designation of pale



North corridor of the third floor at the Rubber Show in Grand Central Palace, showing some of the Brazilian exhibits

Where the Malayan products are shown under the auspices of the British government

crepe. If it is to be sold as smoked crude, it is placed in a smoke-house where the fumes from burning wood can be introduced.

"Just what effect smoking has upon crude rubber is still a problem. It is said that the wild rubber gains strength from the process. In my opinion the smoke acts as a preservative by introducing an element of creosote. I am not prepared to say that it adds anything to the strength of the product.

"The crepe or sheet is then packed in boxes or other packages and shipped to market.

"Mechanically the requirements of the plantation rubber industry are few and simple, as may be seen from the foregoing outline. In fact, it is one of the most obviously direct and uninvolved processes in agriculture. A knife, a cup, a pail, a tank-wagon, a coagulating vat, a little acetic acid, a pair of rollers and some green wood smoke.

"Now, as to the future of the industry. Broadly speaking, no large general commercial project can ever pay 100 per cent. on the investment per annum for any extended period of time, figuring the appraised valuation of the property each year with reference to its return in dividends.

"In other words, if rubber now returns 100 per cent. or more on current investment over the cost of production, and if there is a possibility of increasing the acreage and consequently the yield, the increase must be accomplished because the industry would attract unlimited capital and energy to participate in such profits.

"If the field is open and the opportunities unlimited, the man who has money to invest will choose rubber with a large return rather than something else which returns less.

"I can say that there is still a vast acreage available for rubber production that has never been exploited so far.

"It is generally admitted that at 2 shillings a pound there is a comfortable margin of profit, and the price averages over 4 shillings. It should be understood that the plantations now in bearing are those planted prior to 1907 and that since that year the acreage under rubber has doubled and trebled. The United States Rubber Company now has 22,000 acres of land planted to rubber in Sumatra and is extending its planted area with much vigor and will probably reach 25,000 acres before the end of this season. None of these trees is producing yet. Some idea of the producing capacity of the transplanted rubber tree can be gained from the careful records kept of the first trees raised in Ceylon. The figures show that a single tree has produced 240 pounds of dry rubber in 3 years. In the Ceylon exhibit at this show we have 17 pounds of dry rubber produced by that particular tree in April, 1912.

"Of course, such a general average production is away beyond our hopes and expectations, but if at full maturity the trees will yield even an average of 50 pounds per year, the total production of the plantations will be enormous. If the average acre under rubber has 200 trees, and supposing that the total acreage is 1,000,000, a very conservative figure, the eventual yield would be 10,000,000,000 pounds a year, or 5,000,000 short tons. At 4 shillings a pound this would represent a sum equal to the total valuation of the bumper crops of the whole agriculture of the United States for 1912.

"It is inconceivable that there should be any such price secured and the obvious conclusion is that the market level must yield. When it does yield, it will cut off the more remote sections raising rubber under jungle conditions. This must be true, because the expense of collection, transportation and marketing will prevent the wild rubber from such districts from competing with the cultivated product.

"Of course, I realize that improvements will be made in present methods of handling the wild rubber situation. Good roads, more railroads and a variety of factors will be introduced, but you may put it down as a settled fact that wild rubber costing more to produce and market than cultivated rubber must yield the right of way.

"In the past the point has been strongly made by the wild rubber section of the industry that the wild rubber is stronger, more uniform and more satisfactory than the cultivated varieties. There was some element of truth in these contentions, but great improvements have been made in the way of securing uniformity in plantation production. It is only reasonable to conclude that approximate uniformity can be gained under scientific methods, which, in my opinion, is all that need be said on that subject. As far as strength is concerned, it has been learned that immature rubber, or rubber obtained from immature trees in the plantations, is not so strong as that from the veterans of the Brazilian forests. Neither is mixed latex as good a foundation for rubber as pure milk from trees of full size and approximately equal age. But I am awaiting a test of the lump of rubber from the oldest and biggest tree in Ceylon in comparison with the best of the indigenous types of rubber. I believe the slight difference in tensile strength that has been noted is the result of the difference in the ages of the trees whose product was tested."

E. G. Salmon, Commissioner from the Imperial Institute to the exposition, takes a most optimistic view of the plantation rubber industry. Mr. Salmon believes that in the near future the lowering of prices and increase in the visible supply of rubber will cause it to be used much more widely than at present. He estimates that the automobile industry eventually will use something in excess of 100,000,000 pounds of rubber each year, but that the supply will be increased to such a degree that there will be a falling market for rubber for several years.

In a broad sort of way such an hypothesis would account for the attitude of buyers in the markets of the world. It has been noted that since April, 1910, when up-river fine stood at $3.10 a pound the buyers of rubber have been inactive. The trading was largely limited to the acceptance of rubber offered rather than securing it by bidding. As the supply has increased gradually but constantly and with it the offerings in the market, the lot of the purchaser has been easier than that of the seller.

From the buyers' viewpoint, purchases for future delivery in large lots could not be justified in a falling market on a basis of current prices. Therefore the dealings have been on a basis of lower figures for over 2 years, despite the much augmented total of sales.

On the other hand it is pointed out that the demand will increase much above the present level as new uses for rubber make themselves felt. Mr. Salmon believes that in the future rubber shoes without fabric will be common.

Rubber in the Spotlight

Large Attendance Marks First Sessions of Convention and Exposition In New York

Twenty-two Countries Represented by Official Exhibits of Which Brazilian is Largest

CRUDE rubber, rubber machinery used in production and preparation for market and in shaping the substance under various manufacturing processes and the finished manufactured products based upon rubber are shown with a wealth of detail at the Third International Rubber Exposition, which opened at the Grand Central Palace on Monday.

The exposition will continue until October 3 and during that period the men connected with the industry, shippers, manufacturers and growers will hold a convention similar to those of 1908 and 1911 in London.

Three floors of the big building are used for the show, the main floor being devoted to machinery; second, to manufacturing processes, reclaiming, chemicals, etc., and the upper floor contains a very complete display of crude rubber.

There are twenty-two countries or states represented in the crude rubber show, the largest display being made by Brazil, which has an exhibition space of 10,000 square feet. All the Brazilian states in the Amazon valley are represented with complete displays of crude wild rubber and a small representation of the cultivated product.

Among the other countries showing wild rubber are the African colonies of various European countries, Mexico, Central America and some parts of the East Indies.

The plantations are represented mostly in the displays of Ceylon, Malaya and the East.

Synthetic rubber has a part in the show, but from the commercial viewpoint it is not important at this stage of development. Such samples as are shown are said to equal the natural product in quality and service, but are eliminated from consideration by the cost of manufacture.

On the third floor there are exhibits of crude rubber aggregating not far from 150 tons and worth approximately $350,000 in the market. The Brazilian exhibits weigh about 90 tons and include all the commercial grades in six different varieties. All told, the different kinds of rubber shown in the Brazilian space number over thirty-five. The production of Brazil is about 40,000 tons a year.

Next in size to Brazil is the display of Malaya, which includes the Straits Settlements and Malay states under British protectorate on the Malay peninsula along the Straits of Malaca. This display is almost wholly of high-grade plantation rubber, ranging from pale crepe, which is not smoked at all, to smoked block rubber, which is about as dark as the wild Brazilian product. The Malayan production is not far from 15,000 tons.

Ceylon comes next in size and importance from the viewpoint of the automobile industry, its annual production being around 5,000 tons at the present rate. Other countries have exhibits, particularly the Philippine and Hawaiian Islands, but aside from Brazil, Malaya and Ceylon they are not of the first importance to the automobile business.

It has been conservatively pointed out that the world's production of rubber in 1912 will be about 90,000 long tons and that the automobile industry will account for 31,000 long tons.

Production is increasing steadily, but not rapidly in Brazil and is racing in the plantations of the Mid-East. It is estimated that the total yield of the plantations in 1915 will equal that of the indigenous product.

The United States Rubber Company has one of the largest show spaces in the building. A full line of its product is displayed and an interesting announcement has just been made by President Samuel P. Colt that the company has nearly finished the planting of 25,000 acres in the Island of Sumatra. Reckoning this plantation at 200 trees to the acre and the eventual yield at 50 pounds of dry rubber per tree, the supply of rubber for this company will some time reach the enormous amount of 50,000,000 pounds a year. Such a result is still far in the future, as the oldest of the trees on the plantation is now only 18 months. Trees begin to bear after their fourth year, and the production is small until they are 12 years old or more. The life of the rubber tree has not been determined so far as the plantations are concerned. The oldest trees in the Ceylon plantations are about 36 years old and all others are younger. The veterans are producing more rubber per tree than any of the others, and so far have shown few symptoms of age.

The exposition was preceded by a formal luncheon on Sunday at which Henry C. Pearson, vice-president of the convention, acted as toastmaster. It was attended by most of the dignitaries present as representatives of the rubber countries and the speeches promised much interest in the convention of the industry.

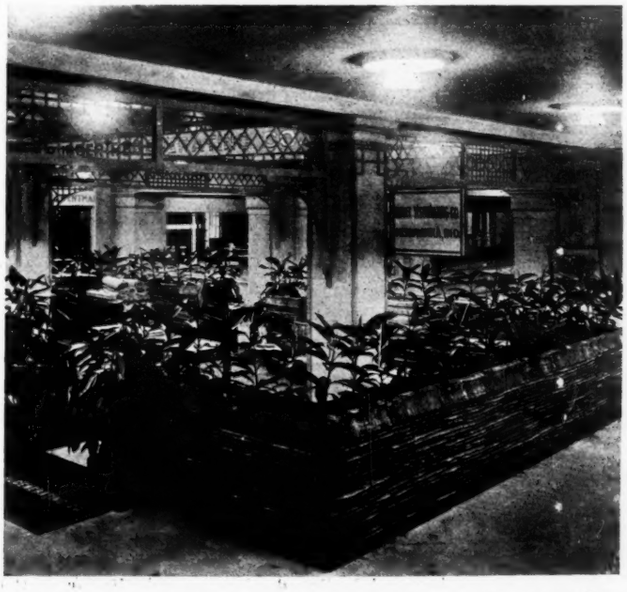
Mayor William J. Gaynor opened the show on Monday noon and a large attendance was enjoyed. The chief interest centered in the displays of crude rubber. A. Staines Manders, who successfully managed the former shows, is the organizing manager of the present exhibition.

A preliminary session of the convention was held on Monday, but the actual business of the gathering did not commence until the following day.

The attendance of Tuesday proved a surprise to the management on account of its size and quality. There were delegations from practically every section of the rubber industry, which were expected, but in addition the general public and particularly the automobile interests were strongly represented.

One feature of the show which proved surprisingly acceptable to the patrons was the fact that no retail selling was countenanced and the attendants at the various booths were equipped to inform inquirers as to the features of the exhibits displayed.

The general plan of decorations uses more color than has been customary in exhibitions held in the Grand Central Palace but the general effect is not unpleasant. In the crude rubber section the native types of architecture form one of the most interesting features of the show.



Growing rubber plants forms leading feature in the decorative scheme of the exposition

Trade News of the Week

Palmer & Singer Manufacturing Company Takes Out Licenses Under Two Groups of Dyer Patents

Applications for Space in Both Big National Shows Coming in Faster Than Ever Before

LICENSES under two groups of Dyer patents have been granted to the Palmer & Singer Manufacturing Company and the long litigation between the Enterprise Automobile Company and the defendant concern will be abandoned.

The patents involved in the license rights are first, the two covered by the settlement recently made between the Enterprise company and the Automobile Board of Trade by which the A. B. of T. was given the right to recommend the issuance of seventy-five licenses to its members on payment of a lump sum to the assignees of the patents. These patents cover the selective type of gear-change mechanism with direct drive in use generally. The other patent is one of the group of five that were originally sold to the Patents Holding Company in the days of the Association of Licensed Automobile Manufacturers and which were reconveyed to the Enterprise Company as part consideration for the license rights granted to the A. B. of T.

It is understood that the royalty rate is to be 1-10 of 1 per cent. on each of the three patents, thus making the aggregate royalty paid $3 on each $1,000 based on the retail list price.

The Enterprise Company has been inactive in prosecuting individuals since the settlement was made.

The suits against the defendants are docketed in the United States District Courts for the Southern and Eastern Districts of New York and will be expunged from the records as soon as the formal order is entered.

Berkshire Undergoing Liquidation

BOSTON, MASS., Sept. 23—Creditors of the Berkshire Motor Company, of Cambridge, Mass., have been notified by attorneys that the company is financially embarrassed. Its liabilities are placed at $25,000. Although the company has assets of greater book value than the liabilities, the attorneys have found it necessary to liquidate the affairs of the company. This is being done at the instance of the larger creditors. B. Deveraux Barker, an attorney, and James Addison, of the company, have been appointed agents to carry out the liquidation.

V-C Company to Make Truck

LYNN, MASS., Sept. 23—The recently formed V-C Motor Truck Company organized in Lynn, Mass., with Frank S. Corlew, president and sales manager, and Frank E. Vallier, treasurer and general manager, has secured temporary offices. The company has some well-known men affiliated with it, among them being John M. Nelson, John P. Stevens, William T. Langmaid, J. P. Crosscup, Charles M. Alley and S. D. Ritcey. The company is seeking a factory site in Lynn. The truck will be 1 1-2 tons, using a Continental motor, left-hand drive, center control and with a loading space back of the driver's seat of 9 1-2 feet.

Show Space Is in Great Demand

Applications for space in both the big national automobile shows have been coming in faster this year than ever before in the history of the industry. The New York show under the auspices of the Automobile Board of Trade will be larger than ever before, judged by the character of the applications. Merle L. Downs, secretary of the show committee, has announced that practically every application so far received is for a materially larger space than was asked by the same applicant last year.

He estimates that there are 15 per cent. more early applications than last year.

With regard to the Chicago show, the National Association of Automobile Manufacturers report much the same state of affairs as applies to the New York exhibition.

The Motor and Accessory Manufacturers, which handles a certain amount of space in each of the shows is in receipt of more and larger applications for representation at the shows than ever before.

Allotments of space will be made at the regular meetings of both organizations, which are scheduled to take place during the first week of October.

Johnson Heads Warner Gear

Ray P. Johnson has been appointed general manager of the Warner Gear Company, of Muncie, Ind., to succeed C. E. Davis, who has been named general manager of the automobile department of the American Locomotive Company, at Providence.

Mr. Johnson is an engineer of high attainments and has had much success in the line he has followed. He received his technical education at Chicago University.

World's Crude Rubber Market Sags

Still slowly sagging, is the news of the week from the crude rubber markets of the world. The price basis has been lowered to a level of $1.14 a pound for up-river fine, with the other grades in proportion. This represents a decline of about 2 cents since last week. On account of the record-breaking proportions

Automobile Securities Quotations

Irregularity marked the changes in the list of automobile and accessory stocks during the past week. Most of the list was weak but there were several notable exceptions. No marked advances were scored and the best that can be said for the standard investment stock is that they have been steady. In the speculative issues the trend was downward but the range was small. U. S. Motor showed a fractional advance on covering of short contracts. General Motors was slightly easier. International Motors gained a fraction on persistent buying of small lots

	1911		1912	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., common	..	..	150	..
Ajax-Grieb Rubber Co., pfd.	..	..	95	100
Aluminum Castings, preferred	..	..	100	102
American Locomotive, common	34	34½	46	46¼
American Locomotive, preferred	104½	105	107	110
Chalmers Motor Company	..	..	145	155
Consolidated R. T. Co., common	5	8	13	16
Consolidated R. T. Co., pfd.	10	20	50	60
Firestone Tire & Rubber Co., com.	175	180	273	276
Firestone Tire & Rubber Co., pfd.	106	108	107	109
Garford Company, preferred	..	..	99	100
General Motors Company, common	38	41	36	39
General Motors Company, pfd.	76	79	78	81
B. F. Goodrich Company, common	*237	*242	†77½	†78
B. F. Goodrich Company, pfd.	*118	*119	†106¼	†107¼
Goodyear Tire & Rubber Co., com.	225	235	330	333
Goodyear Tire & Rubber Co., pfd.	105	107	105½	106½
Hayes Manufacturing Company	..	..	..	93
International Motor Co., common	..	..	26½	27½
International Motor Co., pfd.	..	..	81	83
Lozier Motor Company	..	..	43	50
Miller Rubber Company	..	..	..	140
Packard Motor Co., preferred	103	106	105½	107
Peerless Motor Company	..	..	116	120
Pope Manufacturing Company, com.	55	65	34	36
Pope Manufacturing Company, pfd.	73	76	73½	75
Reo Motor Truck Company	8	10	10	11
Reo Motor Car Company	23	25	23	25
Studebaker Company, common	..	..	42½	44
Studebaker Company, preferred	..	..	94¾	96½
Swinehart Tire Company	..	..	99	101
Rubber Goods Company, common	85	95	100	..
Rubber Goods Company, preferred	100	105	105	110
U. S. Motor Company, common	28	30	1¾	2
U. S. Motor Company, preferred	69	71	6	6½
White Company, preferred	..	..	107	109

*Old. †New.

of the offerings at the regular auction in London 2 weeks ago and the reports of large receipts of plantations which will go on the block this week, the buyers are disposed to be conservative and as a result the offerings proved to be in larger volume than the demand could take care of. The New York market has been quiet all week.

Vital Subjects for Sales Managers

The Sales Managers' convention, which will be held under the auspices of the Automobile Board of Trade, September 30 and October 1 will probably attract a large attendance and preparations for a representative gathering from all parts of the country are being made.

The program of the meeting will embrace a wide field of observation. Among the subjects that will be treated by the convention are the following: Freight, shipping, motor car equipment, enclosed bodies, selling and advertising and annual models. As a whole volume might be presented on any one of these subjects the chances are that the proceedings will be filled with interest.

The committee in charge of the affair includes the following: H. O. Smith, F. C. Howard, W. E. Metzger, C. W. Churchill, W. T. White.

C. W. Eggers Promoted by Willys

TOLEDO, O., Sept. 23—C. W. Eggers, who for the past 2 years has been traffic manager for the Overland company, has been made general traffic manager for the Willys-Overland Company; the Garford Company, Elyria, O.; Gramm Motor Truck Company, Lima, O.; Federal Motor Company, Indianapolis, Ind.; Morrow Manufacturing Company, Elmira, N. Y.

Market Changes of the Week

The most important feature of the week's market was the decrease in price of rubber, which was $.02 per pound, caused by lack of trade. Tin varied throughout the week, closing at a gain of $.03 per 100 pounds, as a result of the great demand for it in foreign markets.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, per lb.	.07½	.08⅛	.08⅛	.08⅛	.08⅛	.08¼	+.00¾
Beams and Channels, 100 lbs.	1.51½	1.51½	1.51½	1.51½	1.51½	1.51½	.....
Bessemer Steel, Pittsburgh, ton	24.00	24.00	24.00	24.00	24.00	24.00	.....
Copper, Elec., lb.	17 11/20	.17⅜	.17⅜	.17⅜	.17⅜	.17⅜	+.00 1/20
Copper, Lake, lb.	.17⅝	.17⅝	.17⅝	.17⅝	.17 13/20	.17 13/20	+.00¼
Cottonseed Oil, Sept., bbl.	6.35	6.32	6.36	6.45	6.30	6.38	+.03
Cyanide, Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, (Menhaden)	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals. @	.21	.21	.21	.21	.21	.21	.....
Lard Oil, prime	.85	.85	.85	.85	.85	.85	.....
Lead, 100 lb.	5.10	510	5.10	5.10	5.15	5.15	+.05
Linseed Oil.	.69	.69	.69	.69	.68	.68	—.01
Open-Hearth Steel, ton	25.00	25.00	25.00	25.00	25.00	25.00	.....
Petroleum, bbl., Kansas crude	.70	.70	.70	.70	.70	.70	.....
Petroleum, bbl., Pa. crude.	1.60	1.60	1.60	1.60	1.60	1.60	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Rubber, Fine Up-River Para	1.14	1.14	....	....	....	1.12	—.02
Silk, raw Ital.	....	4.15	....	....	4.15	....	.....
Silk, raw Japan	....	3.75	....	....	3.82½	....	+.07½
Sulphuric Acid, 60 Beaumé	.99	.99	.99	.99	.99	.99	.....
Tin, 100 lbs.	4.95	5.00	5.00	5.00	5.03	4.98	+.03
Tire Scrap.	.09⅛	.09⅛	.09⅛	.09⅛	.09⅛	.09⅛	.....

French Also Fear Invasion

Foreign Makers Generally Alarmed But Unable So Far to Find Practical Check for Americans

Britons and Gauls Futilely Complain That Their Market for $1,000 Automobiles Is Gone

SYMPTOMS of panic which marked the British automobile industry last week, due to the invasion of the British market by low-priced American automobiles, have subsided to a certain extent after a view of the situation from the standpoint of sober second-thought.

According to the cabled news from London, nothing further has developed as regards the formation of a $25,000,000 corporation to make cars to sell at from $1,000 to $1,250 in competition with American lines of somewhat similar price. The idea, according to the distinguished speakers, including the Duke of Westminster and Lord Montagu, was that while the company probably could not equal the American cars of the same class on an even price footing, that the government might be prevailed upon to impose a preferential tariff against the American automobiles to cover the difference in price between the new British lines and the regular product of the American factories.

Aside from the fact that the working of a protective tariff tends to raise wages, and consequently manufacturing costs, which must be covered by the selling price, thus still further emphasizing the difference between the British and American cars, it is pointed out that the secret of American success in the line of small cars lies in economic quantity production, using the most advanced types of machinery regardless of cost.

Leading members of the automobile fraternity emphasize the fact that British production is only about 15,000 cars a year and that if such a factory as has been outlined is to be operated at a profit, the local market must be vastly stimulated and the company must stand ready to compete in the markets of the world for business. A factory such as has been indicated would have to turn out at least 25,000 cars a year which means that a market for at least 20,000 cars a year would have to be found outside the British Isles.

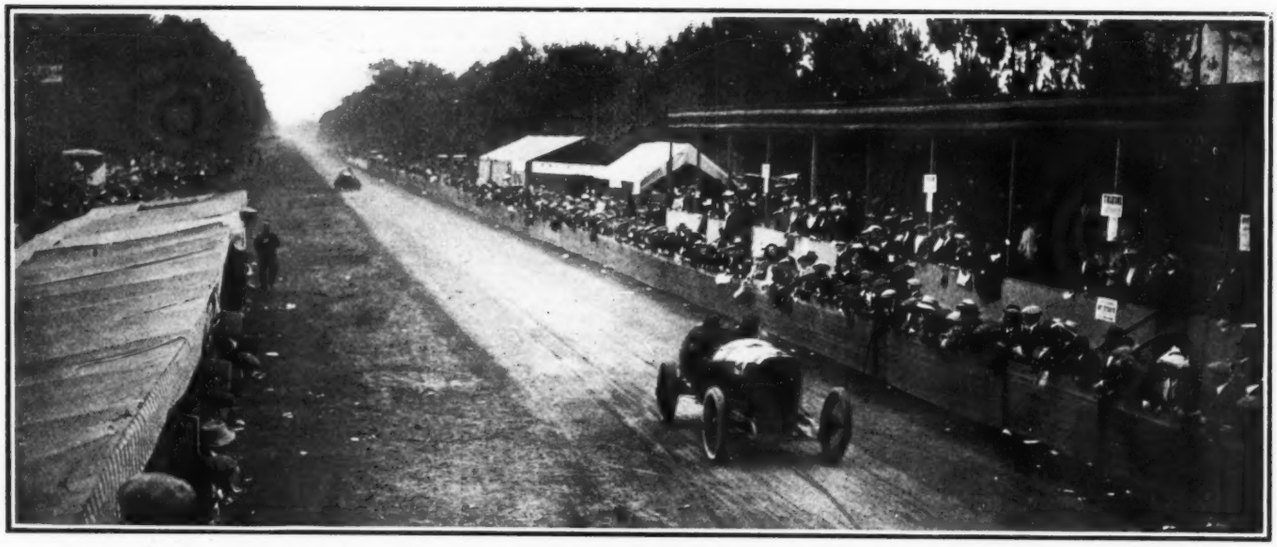
As the proposed preferential tariff would not affect the sale of American cars outside of Great Britain and Ireland, the American manufacturers are not alarmed over the situation.

Following the agitation in England about the invasion of the American small car, which has led to talk of the formation of a corporation with a capitalization of $25,000,000 to build lines to compete with the American automobiles, the French manufacturers are also becoming stirred up. The Frenchmen point out that their local market for cars listed at $1,000 is dead as the result of the American invasion. Both countries are to be protected from the dreaded American automobile by a tari ffwall if the wishes of the agitators are followed. The general opinion of American manufacturers is that no big competitive companies will be formed and that the preferential tariff talk will end in nothing.

BUFFALO, Sept. 23—Formal notification to the creditors of the E. R Thomas Motor Car Company has been issued that George C. Finley and Adolph Rebadow have been named receivers

A preliminary survey of the properties shows that while the nominal assets are in excess of the indicated liabilities, but that a severe shrinkage will be experienced in converting the assets into money. The liabilities are now estimated at $1,100,000.

The factory is closed, but the receivers have determined to continue the operation of the repair and parts departments.



Goux in his Peugeot racer in the Sarthe Grand Prix of 402.6 miles, in which he broke all European records for the distance

New Road Record in Sarthe Grand Prix

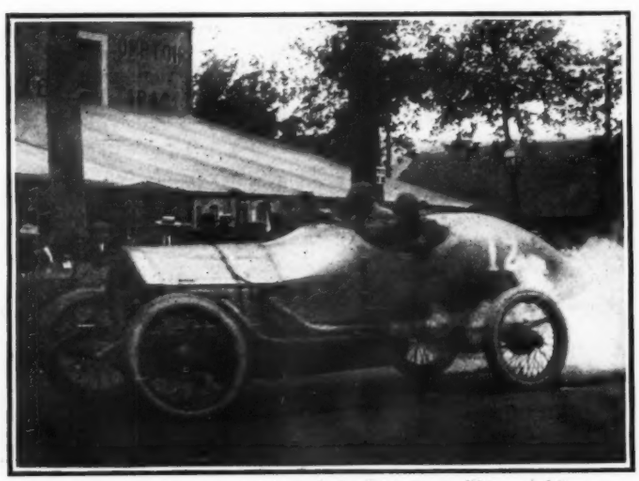
Goux Covers 402.6-Mile Course at 73 Miles an Hour—Zuccarelli Wins 3-Liter Race

Peugeot Proves Itself the Fastest Long-Distance Car France Has Ever Produced

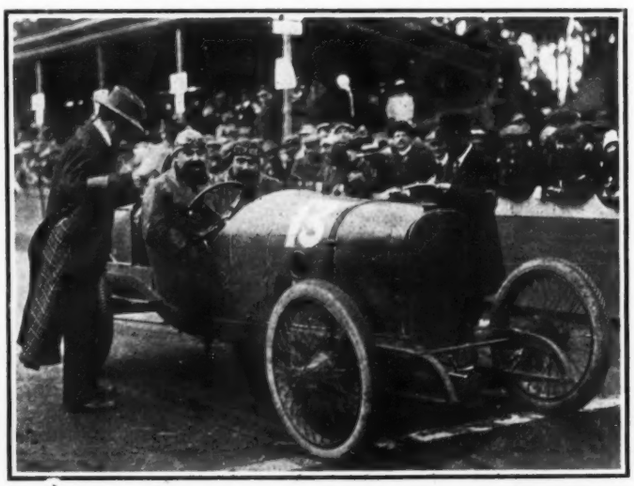
LE MANS, France, Sept. 20—At practically 73 miles an hour Jules Goux won the Sarthe Grand Prix, 402.6 miles, race on a Peugeot identical with the car with which his teammate, Georges Boillot, captured the grand prix at Dieppe. This performance, of which a cable dispatch appeared in THE AUTOMOBILE last week, broke all European records for this distance and finally classed the Peugeot as the fastest long-distance racing car France has ever produced. Incidentally, this was one of the cars which should have been sent to the American races at Elgin and Milwaukee, but at the last moment was kept back to race at Le Mans, owing to a disagreement between the American backers and the French firm. It was fortunate that the Peugeots were kept at home, for without them the free-for-all class at Le Mans would have been a hollow event. There were the two Peugeots belonging to Goux and Boillot, a Crespelle with long-stroke single-cylindered De Dion motor and practically a stripped touring model S. P. A., driven by Leduc. As the Peugeots could walk around their rivals, there was an entire absence of competition in this class.

Boillot, who had started last, came in at the end of his first lap for a tire. At the end of the second lap he pulled in for another tire. After the third lap he took a wheel in place of one that had shed its tire. After the fourth lap he stopped again, crawled under his car to look at the universal housing, peeped at his motor, and went on. In the fifth lap he made the record of the race—33.55 miles in 25 minutes 9 seconds, including a stop for a tire—being equal to 79.9 miles an hour. Making a deduction for the stop, the average speed for the lap was about 85 miles an hour. His accident was not altogether unexpected and was irreparable. One of the bolts holding the exhaust manifold had broken; a repair was effected at the last minute, but, as the bolt went through the waterjacket, a leak was feared. It was after the fast lap that the water began to get away, finding a passage into the crankchamber and the oil reservoir and suddenly causing the complete seizure of the engine.

With Boillot out, it remained for Goux to maintain the Peu-



Molon in his Vinot at the Ponthiou hairpin turn

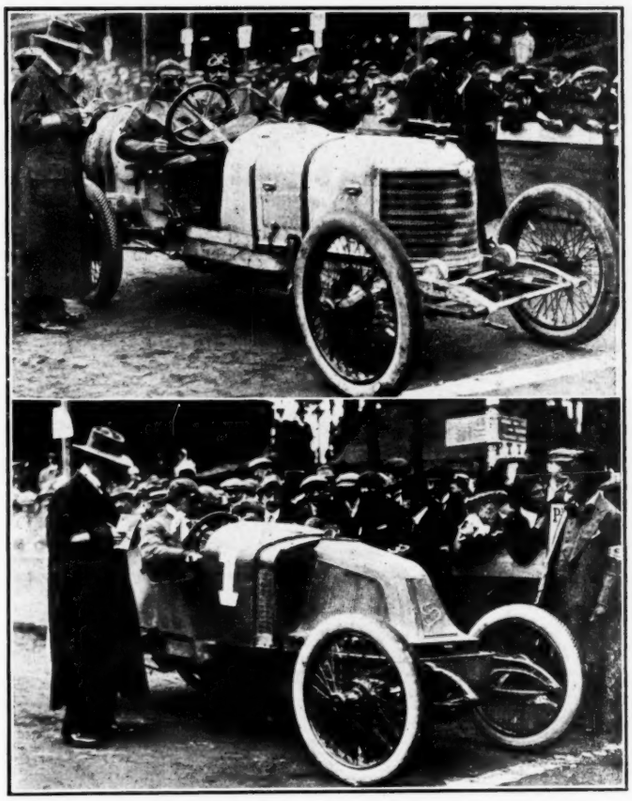


Zuccarelli finishing the small-car race in Lion-Peugeot

geot fame. He did it by covering the twelve rounds with nothing more than three punctures and a stop at half time to fill his tanks.

The competition lacking in the big class was provided in the 3-liter section, that is, for cars of 183.069 cubic inches piston displacement. The two sets of cars were run together, the small ones going away first at intervals of a minute and the big ones after. Lion-Peugeot, Alcyon, Schneider, Vinot-Deguingand, Hispano-Suiza, Crespelle, Cote, Picker and Koecklin were the firms represented. Thomas, on Lion-Peugeot, set a fast pace, coming round to the stands before Boillot had got away, and maintaining an average of 70 miles an hour, a really fine performance for a car of 3.07 by 6.14 inches bore and stroke. Guyot, handling a car known as the Picker, was unable to get away when his call came. He had to take down his clutch, remove a defective plate and put it back again, the work occupying almost 2 hours. Nicodemi, one of the Schneider men, was not present when his start was announced. He had started out late for the course, but at length appeared on the course with a loss of 30 minutes.

After his fast initial lap Thomas disappeared; Zuccarelli took his place, with Barriaux and Duray, both on Alcyons, hard after him and the two Vinots pressing the Alcyons close. The Schneiders were further down the list, but going well. After three laps, Zuccarelli with the small Lion Peugeot had got ahead of Boillot with the big Peugeot, and had a lead of more than 4 minutes on Barriaux, the nearest rival in his own class. Champoiseau of the Schneider firm had pulled in ahead of the Vinots and Croquet; another Schneider man was just to the rear of the Vinots. At half distance six cars were closely bunched, the intervals between them varying from a few seconds to 6 minutes. On the seventh lap Duray began to have trouble with the valve springs of his Alcyon, and realizing that the race was finished so far as he was concerned, stopped to bring Boillot home on his car. At this time the greatest excitement of the race was felt. Zuccarelli was being dangerously pressed by Barriaux on the Alcyon; the Vinots were running the Alcyons close, and Champoiseau and Croquet, of the Schneider team, had a personal jealousy in addition to their desire to beat the others. Guyot, after his long delay, had got into the running in excellent style, although obviously unable to wipe out the initial handicap of 2 hours. On his seventh lap, after making second best time, Guyot pulled in for gas. He filled the dashboard tank from a big can without the use of a funnel, and in doing so allowed a considerable amount of gasoline to run over the car. Just as he was pulling away there was a pop at the carbureter, and at the same instant flames appeared around the filler cap. Guyot and his mechanic jumped out and instinctively backed away from the car, while the grandstand spectators began to run at the fear of an explosion of the tank. But no explosion came, and after a few seconds of panic rags were thrown on the car to stifle the flames, and in 5 minutes the fire was extinguished. Having replaced his burned-out ignition wires, Guyot continued, put up a couple of fast laps, but was unable to finish in the time limits

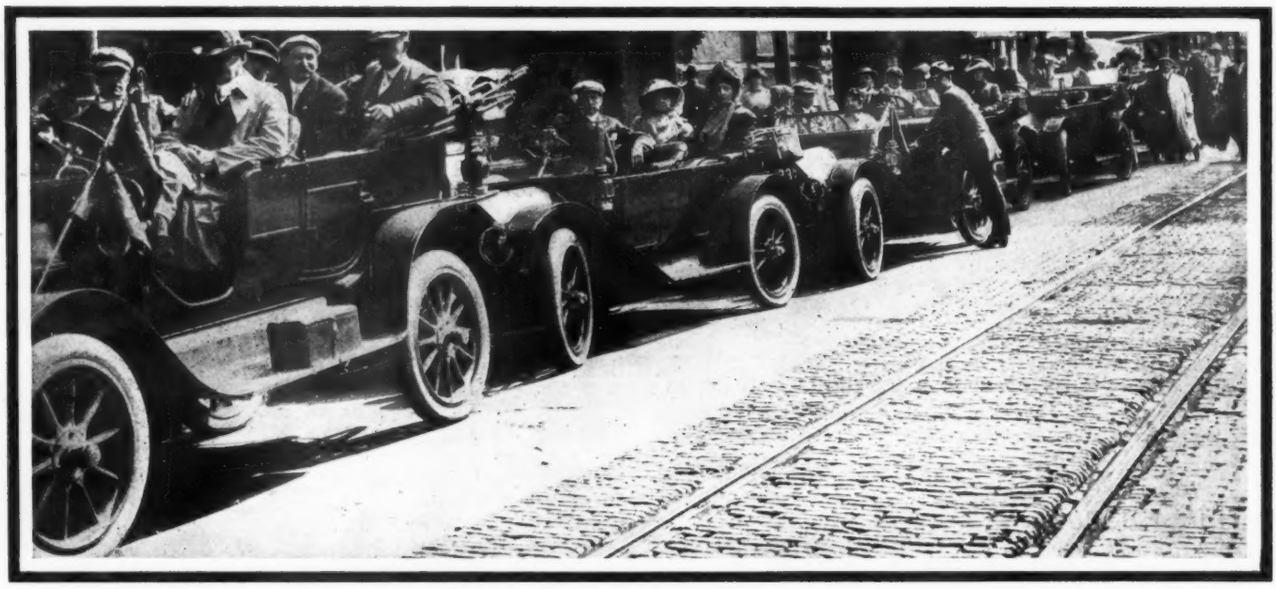


Upper—Duray starting in Sarthe Grand Prix race in his Alcyon
Lower—Champoiseau starting his Schneider in 3-liter race

Towards the end Zuccarelli and Barriaux were fighting for first place, with Champoiseau on Schneider and Molon on Vinot struggling for the following positions. The final result was doubtful when, with only 20 miles to run, a ball bearing broke in the steering gear of the Alcyon car, making an easy win for Zuccarelli's Lion-Peugeot, putting Champoiseau's Schneider second, with Molon's Vinot a very close third and Croquet's Schneider fourth. Duray had been held back by valve-spring troubles; the two Cotes were regular without being particularly fast, and Riviere's Hispano-Suiza, a 4-year-old model of 2.5 by 7.8 inches bore and stroke, did not show itself equal to the modern cars.

TABLE SHOWING THE TIME MADE IN EACH LAP BY THE CONTESTANTS IN THE 402.6 MILE SARTHE GRAND PRIX

Laps Miles	1 33.55	2 67.1	3 100.65	4 134.2	5 167.75	6 201.3	7 234.85	8 268.4	9 302.95	10 335.5	11 369.05	12 402.6
Goux, Peugeot	0:25:57	0:51:26	1:16:42	1:42:36	2:08:31	2:37:33	3:06:29	3:31:55	3:57:57	4:31:01	5:03:37	5:31:54
Leduc, S. P. A.	0:32:30	1:04:08	1:35:46	2:13:06	2:44:32	3:16:05	3:51:05	4:44:39	5:19:24	5:51:39	6:23:25	6:55:18
Boillot, Peugeot	0:27:15	0:54:42	1:25:43	1:57:48	2:22:57	Seized	engine					
Crespelle, Crespelle	0:35:42	1:23:09	2:38:00	3:12:52	3:47:50	4:44:35	5:20:58	6:01:55	6:37:18	Broken	valves	
	THR	EE - LIT	ER CAR	S (183.06	9 CUBIC	INCHES	DISPLA	CEMENT)				
Zucca, , Lion-P	0:29:33	0:58:01	1:26:23	1:54:39	2:23:01	2:51:11	3:22:39	3:50:49	4:19:41	4:48:54	5:37:37	6:12:22
Champoiseau, Schneider	0:31:30	1:02:38	1:33:26	2:05:06	2:36:51	3:11:11	3:46:36	4:18:12	4:50:24	4:25:15	5:59:03	6:30:36
Leon Molon, Vinot	0:32:28	1:03:29	1:35:52	2:10:01	2:45:57	3:17:21	3:48:32	4:22:11	4:57:09	5:28:25	6:00:00	6:31:31
Croquet, Schneider	0:33:56	1:18:31	1:54:04	2:25:52	2:59:17	3:32:43	4:15:03	4:47:36	5:20:12	5:54:27	6:27:52	7:00:33
Lucien Molon, Vinot	0:32:16	1:04:20	1:34:50	2:06:15	2:37:43	3:09:08	3:40:53	4:15:49	5:38:24	6:11:22	6:43:43	7:16:13
Nicodemi, Schneider	0:58:24	1:35:42	2:12:38	2:46:34	3:22:23	3:56:39	4:30:54	5:04:26	5:37:28	6:10:40	6:44:09	7:17:36
De Vere, Cote	0:39:30	1:15:48	1:52:43	2:31:54	3:06:36	3:46:53	4:23:54	5:08:12	5:50:16	6:27:51	7:04:49	7:41:35
Riviere, Hispano-Suiza	0:34:27	1:13:38	1:52:45	2:28:01	3:03:09	3:38:45	4:13:51	4:54:20	5:29:47	6:03:47	6:52:53	7:50:06
Duray, Alcyon	0:30:47	1:01:01	1:30:24	1:59:46	2:29:38	3:03:10	3:39:10	5:01:08	5:44:38	6:52:02	7:32:05	8:12:10
Ollier, Cote	0:37:18	1:13:13	1:55:59	2:37:56	3:16:37	3:52:40	5:32:32	6:14:37	7:03:10			
Barriaux, Alcyon	0:30:45	1:00:28	1:30:19	2:00:04	2:29:36	3:01:01	3:30:20	3:59:30	4:36:30	5:10:52	5:40:53	Broke
Guyot, Picker-Guyot	2:21:56	2:53:25	3:24:10	3:54:39	4:25:06	4:55:36	5:31:14	6:32:30	Car took	fire		steering
Jaubert, Schneider	0:37:45	1:14:34	2:03:12	2:40:00	3:18:07	3:54:31	4:50:24	Broke di	stributer	driving c	hain	gear
Koecklin, Koecklin	0:39:37	1:15:34	Broke re	ar spring								
Thomas, Lion-Peugeot	0:28:51	Broken	valves an	d plugs								



Start of the fourth annual secret time sociability run for the "Syracuse Herald" trophy. C. B. Shaw won the run in a Buick

Speedway Races for 1913

May 30 and 31 Are Dates Set for 2-Day Meet—Entries Open January 1 and Close May 1

Entry Fee $500 for Long Distance Race, Which Will Probably Cover 500 Miles

INDIANAPOLIS, IND., Sept. 25—C. W. Sedwick, manager of the Indianapolis Speedway, has announced that a 2-day meet will be held on May 30 and 31. The first day's event will be a long race, in all probability 500 miles, while the second day's card will include a series of shorter races. For the long race the piston displacement will be fixed at a maximum of 450 cubic inches and the minimum weight at 1,600 pounds. Entries will open January 1 and close May 1. The entry fee for the long race is $500. For the latter race one of the requirements will be that the cars must be able to attain a speed of 75 miles an hour. A purse will be put up for the winner of the long race while on the second day, the prizes will probably include the Wheeler-Schebler trophy, the Prest-O-Lite trophy or the Remy brassard with its attendant salary of $75 per week.

Glidden Tour to Start October 14

On account of slowness in receiving entries for the National Reliability Tour of the American Automobile Association, the date of the start for the tour has been postponed until October 14, a week later than the original date. Announcement has been made by the A. A. A. that the reason for the slowness referred to is that many owners wished to compete with 1913 models and that deliveries of such have been slow.

The tour will cover 1,670.3 miles, commencing at Detroit and ending at New Orleans and will require 13 days of running.

Dawson Reinstated by A. A. A.

NEW YORK, Sept. 24—At the September meeting of the Contest Board of the Automobile Association held at headquarters yesterday Joseph Dawson, winner of the 500-mile Indianapolis speedway race, who was automatically disqualified as a registered driver for giving an exhibition at an unsanctioned meet at Memphis, Tenn., July 4, was reinstated, to take effect at once, as was his manager Shuart. Fred Radina, a Cino driver, was also reinstated. Applications for reinstatement from the Schacht Motor Car Company, Hugh B. Andrews and T. S. Duby, were rejected. The Cleveland agency of the Stutz was disqualified until January 1, 1913, for advertising the Stutz performance at Elgin as that of a stock car, when these races were non-stock. The records of Spencer Wishart in the 200-mile race at Columbus were accepted; the recent Brighton Beach records, timed by Warner timer, were accepted; and the recent track records at Cleveland, timed by the Baker electrical timer, were also accepted.

Minor Contest Items

As a test of reliable service the Long Island Automobile Club will conduct a century run October 5. Under the conditions the contesting cars must make five control points without allowing more than 15 seconds tolerance at any of the checking stations. They are approximately 20 miles apart and the whole course is exactly 100 miles. The aggregate running time for the 100 miles is 5 hours, or an average of 20 miles an hour.

The course is from the old Pettit Hotel, Jamaica, to the Mansion House, Roslyn; Grand Central Hotel, Hempstead, Creed avenue and Hempstead Turnpike and back to the starting point.

PITTSBURGH, Sept. 21—Four out of the six races run today on the Brunots Island track, near this city, were taken by Klinekars entered in the events by the manufacturer. The Kline drivers were Menker and Kerr. Menker drove the 6-60 Klinekar against Burman in the Ohio "999" and Horan in a Cutting, defeating both in the 5-mile free-for-all in 4:55, Horan dropping out of the race due to his running through a fence. Menker also won another 5-mile event in 4:58.06, while Kerr took the 5-mile free-for-all in a 4-40 Klinekar in 5:34. Burman and his Ohio were defeated in this event also.

ATLANTIC CITY, N. J., Sept. 21—Car No. 2, a Cadillac, Charles L. Martin driver; No. 36, a Pullman, C. Edward Firth; No. 25, Reo, David Cram, and No. 74, American, J. E. Mountain, captured the prizes awarded the four contestants finishing nearest a secret time schedule in the second annual sociability run of the

Lu Lu Temple Automobile Club from Philadelphia to the Hotel Strand, Atlantic City, today, seventy-four cars participating.

The official time designated for the 61 miles was 3 hours 13 minutes 30 seconds, and that competition was keen is indicated by the fact that all four winners finished 2 minutes or less from the mark. First prize winner's time was 3 hours 13 minutes 10 seconds; second, 3 hours 13 minutes 10 seconds; third, 3 hours 11 minutes 30 seconds, and fourth, 3 hours 13 minutes 25 seconds.

Although the weather was a trifle too cool for comfort, necessitating the wearing of heavy wraps, the South Jersey constables made it warm enough for many contestants before reaching the terminus of the run. These worthies made themselves more than usually bothersome to those participants in the run who were at all inclined to take improper advantage of the splendid roads of New Jersey.

Taken all in all, the run was a great success, not only as a competition, but also as a social event, the contestants especially enjoying the warmth and comfort at their destination after driving in the cold.

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Syracuse Run a Success

SYRACUSE, N. Y., Sept. 23—The most successful automobile run ever held out of Syracuse, under the auspices of any organization, took place Saturday when 110 machines took part in the fourth annual sociability run for the handsome silver trophy cup offered by the Syracuse *Herald* The small number of machines that turned out for the Watson Cup run of The Automobile Club, of Syracuse, this summer had led some to believe that public interest in runs was waning. However, today's fine showing proves two things: first, that motorists hereabout prefer the shorter runs, and second, that ideal weather and road conditions will bring them out.

C. B. Shaw's Buick, the winner, has the distinction of coming in within 23 seconds of the official time designated, this being 3:48:45 and known only to Mayor Edward Schoeneck. For this run of 60 miles, over beautiful country southwest of Syracuse, the secret time had been based generally upon both state and local speeding laws, and the times made showed that motorists had been studying these to a great extent.

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MEMBERS of the St. Louis Automobile Club and a number of other St. Louis Motorists will take part in the Pilgrimage to the old home of Daniel Boone, at Mineola Springs, on September 26 and 27. A part of the road which leads to this historic old place is in bad condition and a number of state officials are working to have it put in first-class condition.

Milwaukee Postponed

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Bad Condition of Course and Continued Inclement Weather Responsible for the Change of Schedule

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Vanderbilt Now Set for October 2 with Small Car Races on October 3 and Grand Prix on October 5

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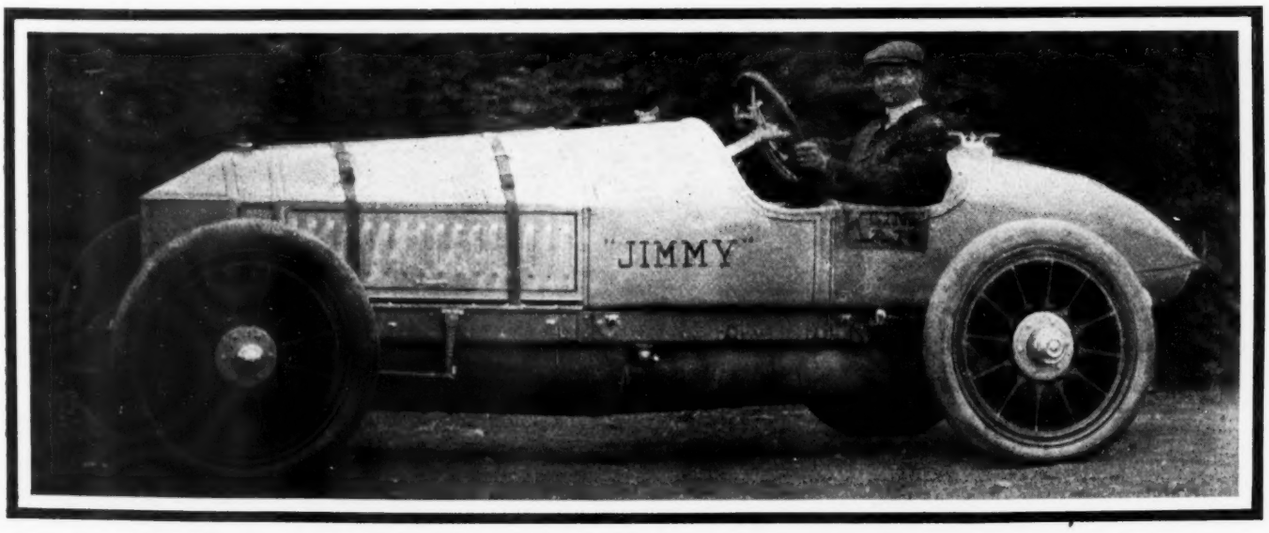
MILWAUKEE, Sept. 21—Bad course and inclement weather were responsible for the postponement of the race carnival, which was scheduled for September 20, 21 and 23, until the first week in October. As now arranged, the Vanderbilt Cup race will be staged Wednesday, October 2, followed by the two small car races, namely, the Pabst Blue Ribbon and the Wisconsin events on October 3, with the Grand Prix Saturday, October 5.

The week previous to the race week as scheduled was rainy, and this was of course a handicap to the road builders. On Friday, the race fans, drivers and all Milwaukee awoke to find an exceedingly threatening sky overhead and the disagreeable weather continued through Saturday.

Fully 40,000 tickets had been sold for the Vanderbilt Cup race, and these as well as those for the other 2 days' racing will be honored on their respective dates next month. No ticket money has been refunded.

All that is needed is warm sun for the coming week, and with continued work on those parts of the course which have proven to be soft, the road should be in fair shape by October 2. Considering that the course has been out of the road maker's care only a few days, and that there has been much rain lately, it is in as good condition, and even better, than should have been expected.

It is understood that the whole city of Milwaukee will combine with the M. A. D. A. to make the meet a big success when it is finally pulled off. All the various associations of the city will pull together, and with this increased interest, things should move along at a good clip. The hotel men's association, the Chamber of Commerce, the automobile club of the city have all joined hands with the parent organization. In fact Milwaukee has completely waked up, and has realized what it will mean to the city to carry the speed carnival off creditably, and all interests intend to see that such is the case.



James Kline, builder of the Klinekar, in one of his racers which starred at the Pittsburgh races last Saturday

Fire Chiefs See Motors

500 Department Heads at Denver Convention Look for Motorization of Their Equipment Throughout Land

Find That Economy, Reliability and Availability Under All Conditions Favor Automobile Against Horse

DENVER, COL., Sept. 23—Motor-driven fire-fighting equipment was the almost universal topic of discussion among the fire chiefs who met this week in Denver at the fortieth annual convention of the International Association of Fire Engineers. Of the eleven papers read and discussed at the meetings of the association, five dealt with motor-driven equipment, and none was more thoroughly discussed or listened to with greater attention than those on the subject of motors in the fire department service.

Among the subjects presented to the convention were papers on Tractors for Steam Fire Engines, Aerial Trucks and Water Towers, read by Chief Kenlon, of the New York fire department, and R. H. Bawker, chief of the department of Passaic, N. J.; Motor versus Horse-drawn Apparatus in Deep Snows, by Chief Smart, of Calgary, Can.; The Efficiency of the Motor Pumping Engine, by Geo. W. Boothe, chief engineer of the National Board of Fire Underwriters; and the Triple Combination Hose Wagon, Chemical and Pumping Engine, by F. J. Connery, chief of the Newcastle, Pa., fire department.

A canvass of the 500 fire chiefs gathered at Denver showed that practically every municipality of 10,000 inhabitants and over had one or more pieces of motor-driven equipment, and in some towns, notably Savannah, Ga., horses had been eliminated. Very few cities are there in which the chief's wagon is not a motor car, and usually the complete motorization of the department is only a matter of time after the advantages of motors over horses are demonstrated by the chief's own vehicle.

Speed Factor Is Important

Discussion of the advantages of the motor car over the horse-drawn wagon for the chief is hardly necessary. The foremost consideration is the speed with which it enables the head of the department to reach the scene of fire, have its seriousness gauged, his campaign planned, and be ready to give the necessary orders by the time the apparatus arrives. This is assuming that the motorization of the department has proceeded no farther than the chief's wagon. Where there are other pieces of motorized apparatus, a motor car for the man in command is an absolute necessity, otherwise he would be lagging so far behind his motor apparatus that his usefulness as a field commander would be seriously impaired. As to the actual speed, except on the very shortest runs, motorization of the chief's conveyance cuts in half the time required to reach the scene of battle. And this may be taken as generally true, that wherever the horse has been replaced by the motor in fire department service, the length of time to reach the fire from the station under average conditions is just about one-half of the time required for a similar piece of apparatus drawn by the four-legged tractor. What this means to a department at the early stages of fire when seconds mean thousands of dollars, or perhaps even human lives, needs no dilation here.

This average figure of twice the speed for the motor apparatus to that obtained by horse-drawn equipment is only for runs of medium length. In very short runs there is slight advantage in the point of time for the motors, but when the length of run approaches 1-2 mile or more, the motors gain more noticeably. In the case of very long runs, the motors show the most superiority, for they can maintain speed for the entire distance, whereas the horse driver must regulate his speed according to the distance. All in all, the advantage of the motor in the point of speed increases proportionately to the distance covered.

Very forcibly was this phase of the question presented to the chiefs at Denver on the evening of September 18 when an illuminated fire run was made.

Under average conditions, of load, distance streets and traffic, horse-drawn equipment can make from 10 to 15 miles per hour, while the motor-driven equipment under corresponding conditions can average between 20 and 30 miles per hour.

Figures for the cost of keeping a horse vary between $15 and $25 per month. Chief Kenlon, of New York, finds that the average cost to keep one horse 1 month in the fire department service of that city is approximately $20 per month. In this statement Chief Bawker, of Passaic, N. J., coincides, as do most of the others. Chief Kennedy, of Billings, Mont., finds that each horse costs him $17 per month; Chief Post, of Shelby, O., puts the figure at $19. San Francisco, St. Louis, Chicago, Los Angeles, Cleveland, Cincinnati, Boston, Savannah, New Orleans, Montreal—in fact all of the larger cities expend very close to $20 a month for each of their horses, so this figure can be taken as a good average.

Motor Apparatus Economical

Cost of maintenance of motor apparatus shows a wide variation. A chemical and hose combination costs Shelby, O., $2.60 per month for maintenance, including repairs, gasoline, oil, etc. The motor displaces two horses at $19 per month each or a total of $38 for the two. This represents a saving of $35.40 to the city per month, or over 90 per cent. T. F. Kennedy, chief of the Billings, Mont. department finds that triple combination displacing three horses costs $10 per month. The horses cost $17 each or $51 total per month, a saving through the motor of $41, or better than 80 per cent.

Savannah, Ga., a city of about 100,000 population, has effected a saving of $2,225.78 in 5 months by the use of its motor-driven equipment, according to Chief Ballantyne. This city is completely motorized. It has fourteen pieces, including two chief's cars. The pumps are all gasoline except three which are motorized steamers and are held as reserves. Chief Ballantyne states that the motor pumps save from three to four men, or rather make that many more available as fire fighters in each company.

Very naturally, one of the first developments in the way of the motorization of fire departments was the substitution of a gasoline tractor for horses, hitching the tractor to the same machine as the horses formerly pulled. This method of motorization has been successful, particularly with such heavy pieces as steam pumps, aerial ladders and water towers. New York is perhaps the leader in this method of motorizing, although some other towns are employing it. Passaic, N. J., is one of these and the chief of its fire department, R. H. Bawker, is authority for the statement that the cost of hauling the apparatus so equipped was one-tenth of he cost of hauling the same apparatus with horses. Chief Bawker states two tractors were purchased at the beginning of the year 1910 for pulling the hook and ladders. One is a 90-horsepower tractor which pulls an aerial truck having a 75-foot extension ladder and weighs 10 tons; the other is an 80-horsepower tractor pulling an ordinary city size truck. During the year ending May 30, 1912, the two tractors averaged a cost of $8.85 per month against the cost o $190.10 per month for horses on the same apparatus. These fig ures include gasoline, oil, and repairs of every description to the tractors, and the figures for the horses include feeding and shoeing, repairs to harness and veterinary fees.

Of even more importance than economy is the question of reliability. Chief Kenlon states that during the 6 months ending August 19, a motor-drawn steam fire engine has answered upwards of 500 calls, and in no case has it failed to reach the fire, in most cases in better time than the horses. On the strength of this performance the city of New York has just

(Concluded on page 643)

Autumn Care of the Car

At This Time of the Year Moist, Cold Days Affect the Finish If the Garage Is Not Adequately Heated

Vacuum Cleaner Is Excellent for Removing Dust and Dirt From the Interior of the Body

THE autumn months are always trying to the paint and finish and upholstery of the car. High winds, driving rains, muddy highways and abnormal road and weather conditions generally all conspire to viciously attack everything that makes the car beautiful. Decaying organic and other matter found in country and village highways mixed with the manifold soils are particularly destructive to varnish. Moreover, the car is more frequently and at longer periods exposed to beating storms, which exposure is harsh and unrelenting and blighting to the finish. These same untoward conditions are likewise detrimental to the upholstery, affecting its wear and color and general appearance.

No hard-and-fast rules need be written down to govern the care of the car during this period of weather extremes. Local conditions and circumstances must naturally to a certain extent be considered. However, this one general rule will apply to all classes of cars and to all sections of country, namely, frequent washing of the car with water robbed of its chill. At all events, wash the car immediately after a drive over muddy or wet streets and highways. Wet dust or mud are powerful absorbents, and acting on recently applied varnish, or upon varnish in the full flower of its luster, it will nip the gloss beyond any remedy other than revarnishing.

During the cold, moist days of autumn the car should have storage in quarters with sufficient prevailing warmth to dispel moisture. Moisture in any form except that applied through the process of washing is to a greater or less extent injurious to the finish or to the color under the protection of the finish. Moisture is a subtle medium, and it penetrates spaces often deemed impervious. When gaining a foothold under a body of paint its progress is certain, and the undoing of the finish is sure. It may not undermine the paint structure in a day or a night, and possibly not in months, but once seated it works persistently and with the certainty of fate. Garages and repositories are often inadequately heated during the cold months of the year. This is a bad practice, and to the car owner an expensive one. Other things being equal, the varnish will wear longer and maintain its luster more uniformly when given storage quarters uniformly warmed.

Water Baths Should Be Frequent

The top should at this period of the year receive constant attention, for now are the days of hard usage with days of improper storage. If, when exposed to stormy weather during road service, it is folded up immediately upon its return to storage quarters without drying off, and without the necessary cleaning operations, the top is sure to become very soon the shabbiest-looking part of the car.

Into a 12-quart pailful of tepid water whip enough Castile soap to create suds, and with a soft sponge clean off the accumulations and freshen up the enamel. This, in fact, is about all the treatment that the hand-buffed or the machine-buffed leather top should receive at any time so long as the enamel continues in good condition. Dry off the leather with a chamois skin. If the top is made of rubber, wash with the same weak soap solution, dry off, and, when the wear of the rubber has progressed sufficiently, apply a good, reliable dressing, preferably one bought ready for use.

If choice is made of a shop-prepared dressing, the following formula provides for a thoroughly reliable one: Of liquid asphaltum, one part; castor oil, three parts. Stir into the mass a bit of drop black to soften and increase the density of the color. Rub this on the top with a tuft of clean waste. Mohair tops will require a smart going over with a whisk broom. Pantasote may be sponged off and given a rub with some renovating medium to freshen the finish and keep it in presentable condition.

Ultimately, of course, the Pantasote will require something more substantial than a mere renovating, and when this stage of wear is reached, a thin coat of finishing varnish fully elastic, and thinned with turpentine, should be brushed on.

As a matter of general information for the car owner, it should be stated that all top dressings, renovators and the like should be put on sparingly. A thin, uniform application is more beneficial, invariably, than a heavy volume of material. All cloth linings for the top should get a systematic brushing out, and the leather furnishings likewise require attention. Clean white cotton waste will take up dust and dirt from the leather upholstery. To clean the parts around buttons and tufting, an oval chiseled sash tool, such as painters use in washing up work for varnishing, will be found effective. Carpets and other removable furnishings need to be taken out of the car often and put under the vacuum cleaner. Indeed, the vacuum cleaner under the right adjustment can be put inside the car and made to take out every atom of loose dust and dirt.

A car in constant use, and particularly during late summer and autumn, soon becomes unsanitary if left without regular cleaning work for the inside. With all dirt there is mixed more or less decaying matter, and this to make the car clean and wholesome should be taken out at the end of every run.

Top Should Not Be Folded When Wet

A good practice for removing dust from the outside of the body after a run is to go over the surface with a wool duster. For anything that sticks closer than dust, resort must be had to the water bath; and, in any event, this water bath, as already advised, should be often and generously given. With emphasis it needs repeating that under no circumstances, except those which for the present cannot possibly be surmounted, should mud be permitted to dry upon the finish of the car. When, unfortunately, this happens, a soft spray of water will loosen the earthy substance, and then under a gentle volume of water the surface will come forth clean and bright. Always dry the washed surface off with a clean, lint free chamois skin.

During the autumn months the surface, shorn of its high luster and perhaps a little parched from summer wear, will need, and should receive, the renewing effect of a first-class varnish polish and feeder. What the car owner requires of a varnish cleaner and polisher is that it is positively non-injurious to the finish.

Previous to using any cleaner and polisher the surface, if muddy or overcast with dirty accumulations, should be washed off with clean water.

The same practice applies to the chassis except that, after rinsing off the mud and dust from these parts, they should be coated over with kerosene oil, using a paint brush—a 6-0 oval bristle brush will serve the purpose completely—and then wiped dry with soft, clean waste. This sort of preliminary treatment will ordinarily suffice to clean up the chassis in good shape for the cleaner.

Automobile finishing varnish should possess a multiplicity of virtues chief among which is an elasticity sufficient to respond to all the demands made upon it through the oscillation and straining of the car. It should dry in a manner to be proof, so far as it is possible for the most perfect varnish to so prove itself, against a multitude of enemies. It should have a tough, durable surface, with a capacity to endure and hold itself intact and lustrous to the maximum limit, and it should have the property of being easily cleaned.

Interesting Mathematical Development of Surprising Theory on Countersprings Placed on Record Though with a Note of Disagreement—To Make Tires Hold Carbonic Gas—Some French and German Accessories

COUNTERSPRINGS in Theory and Fact—Matters relating to the spring suspension of motor vehicles form the subject of a widely diffused discussion in European technical publications at present. The use or non-use of spring moderators or shock absorbers interests some of the writers. The means for making a heavy motor truck run smoothly and without harmful vibrations though unloaded present a problem admittedly unsolved as yet. The influence of the spring suspension on the wear of tires and especially the means for obviating the extra wear of tires which is said to be due to the great weight of the parts which move up and down with the rear axle in all vehicles with shaft drive, whether the final driving element is a bevel or a worm gear, form divisions of the subject which engage the attention of the press, though so far, it seems, only with inconclusive results. The use of springs which act in a contrary sense to the action of the ordinary vehicle springs, and yet in conjunction with them, is one of the expedients on which both the theorists and the practicians disagree, though with a tendency to admitting that "there is something in them."

With regard to this expedient Mr. Contet, an engineer whose technical contributions on automobile subjects often scintillate with brilliant ideas, has advanced a startling theory in two issues of the most specifically technical French publication devoted to the construction of automobiles and aviation machines, and references to this theory as one now established are already noticed in articles by his *confrères*. His presentation of the subject is rendered in the following:

CONTET'S THEORY ON COUNTERSPRINGS

An expedient often employed to improve the suspension of automobiles consists in fitting the vehicle spring with a counterspring. The latter is a leaf spring, like the vehicle spring proper, but one whose flexure (or "open") is oppositely directed. This counterspring is then pressed down against the main leaf of the vehicle spring and is held in this position by clips or center bolt, so that the two springs now constitute a single spring in which the main leaf, which alone is formed with eyes for attachment to the vehicle frame, is held between two sets of leaves acting in opposite directions.

It has often been said that this system has no other effect than that of increasing the flexibility of the vehicle spring, since the counterspring acts in the same direction as the load. We shall show that this view is false and that this combination, far from increasing the flexibility, has on the contrary the effect of reducing it.

Let us consider two springs R and R_1, being respectively the vehicle spring and the counterspring. To facilitate matters, they may be supposed to be of the same length. Their ends coincide, their flexures f and f_1 are opposed, f being below the horizontal and f_1 above it. Their coefficients of flexibility are respectively y and y_1. United they form a new spring with a new flexure f_2 which is measured from the contact of the main leaves. Let us calculate this flexure f_2.

As understood, the flexibility of a spring is its deflection under a load of 100 kilograms. The deflection is proportionate to the load. [Hence 100 kilograms divided by y equals the load divided by the deflection.—ED.]

As the spring R has been deflected f minus f_2 its load must be $100 (f - f_2) \div y$.

The counterspring has been deflected f_1 plus f_2, and its load must be $100 (f_1 + f_2) \div y_1$.

As the two springs are in equilibrium the loads which they support and which are due to their mutual reactions are consequently equal, and this fact may be written:

$$100 (f - f_2) \div y = 100 (f_1 + f_2) \div y_1$$

from which

$$(f - f_2)y_1 = (f_1 + f_2)y$$

By isolating f_2 we obtain

$$f_2 = (fy_1 - f_1y) \div (y + y_1)$$

The two springs thus constitute a new spring having the flexure ("open") f_2 of the value expressed in this equation.

Now let us seek to calculate the total flexibility Y of this new spring. To this end let us load it with a weight P and let us find what deflection this weight causes. Let f_4 be the new flexure which the spring takes under the action of this weight P.

The load of the main vehicle spring in the combination under the deflection f minus f_4 must be $100 (f - f_4) \div y$.

On the other hand, the counterspring which presents the same flexure f_4 must be under the load $100 (f_1 - f_4) \div y_1$.

Further, the combination of the two springs is in equilibrium under the action of the load (or tension) of the vehicle spring proper on one side and of the weight P plus the tension of the counterspring on the other side; for the spring is balanced between these forces. We therefore have the equation

$$100 (f - f_4) \div y = P + 100 (f_1 - f_4) \div y_1.$$

Assuming that P equals 100 kilograms, the deflection of the whole spring must then measure its flexibility.

The equation under this assumption is written

$$100 (f - f_4) \div y = 100 + 100 (f_1 - f_4) \div y_1$$

and from this we derive

$$(f - f_4) \div y = 1 + (f_1 - f_4) \div y_1$$

By multiplying the two sides of the equation by yy_1 (which is larger than 0) we get

$$(f - f_4)y_1 = yy_4 + (f_1 - f_4)y.$$

From this again

$$f_4 (y + y_1) = fy_1 - f_1y - yy_1$$

and finally

$$f_4 = (fy_1 - f_1y - yy_1) \div (y + y_1).$$

As, further, the deflection of the complete spring due to the imposition of the weight of 100 kilograms is $f_2 - f_4$, and this deflection represents the coefficient of flexibility Y, we have, by going back to the value given above for f_2,

$$Y = f_2 - f_4 = (fy_1 - f_1y_1) \div (y + y_1) - (fy_1 - f_1y - yy_1) \div (y + y_1)$$

and by developing and simplifying this equation we get

$$Y = yy_1 \div (y + y_1).$$

This result is remarkable, since f and f_1 have disappeared, showing that the original "opens" of the vehicle spring and of the

counterspring are of no consequence. The flexibility of the compounded spring depends absolutely upon the respective flexibilities of the two springs only.

Considering the value for Y, namely $Y = yy_1 \div (y + y_1)$, we see that, as y and y_1 are both positive, the fraction $y_1 \div (y + y_1)$ is smaller than unity and that consequently Y, which equals this fraction multiplied by y, is smaller than y.

The addition of a counterspring, far from increasing the flexibility of the ordinary vehicle spring, has thus, on the contrary, reduced it. And this fact is well known by the makers of these springs; for, when they remodel a vehicle suspension by adding countersprings they are very careful to increase the flexibility of the original springs, either by grinding down the leaves or reducing their number, so that the compound spring may be as flexible as the original spring. Without this precaution the addition of the counterspring would have for its first result a considerable stiffening of the suspension.

We can on this subject make even another curious observation. Supposing that in the value of Y, which measures the flexibility of the compounded spring, y and y_1 are equal; in other words, that the flexibility of the two springs is the same and that the springs are identical, in fact, we shall then have it that

$$Y = y^2 \div 2y = y \div 2.$$

Hence, if two identical springs of opposite flexure are mounted together on the counterspring plan, the flexibility of the combination is one-half of the flexibility of each of its constituents. If instead of placing these two springs in opposition we had placed them side by side, while having them support the same load, the result would have been the same. The flexibility of the combination would have been one-half of that of each of the springs. Identical results are thus reached by contrary expedients.

And if, on the other hand, our two springs had been combined in the shape of a full-elliptic, the total flexibility would have been twice that of each of the two springs, as well understood. By change in the manner of mounting the two springs, it is seen, absolutely different results are obtained.

Since now this is so; since the combination with a counterspring reduces flexibility instead of increasing it, where does then the improvement in vehicle suspension come from which has been ascertained as a result of this combination, provided, that is to say, that the flexibility of the compounded spring has first been reduced to what it ought to be?—From *La Technique Automobile et Aérienne*, July 15 and August 15.

A HITCH IN THE ABOVE MATHEMATICS

[Closing his argument with this question Mr. Contet has completely stated his new theory, and it does not seem to have been disputed as yet. Unless one's faith in mathematics includes faith in the mathematician, however, the theory must be hard to accept. The mere fact that the tension of the counterspring is high when that of the main spring is low, and *vice versa*, makes it appear peculiar that a definite value for Y can be found expressed in y and y_1 alone, these being both constants, while at least two variables ought to enter. One is tempted to look for a flaw in the mathematics. Astonishment begins where it is proposed to calculate the total flexibility of the new spring. Then comes the sentence: "On the other hand, the counterspring which presents the same flexure f_4 must be under the load $100 (f_1 - f_4) \div y_1$."

Exception may be taken to this. The flexure of the counterspring is not f_4 but $f_1 + f_4$, since this is the distance from its position of equilibrium, and thus its load or tension becomes $100 (f_1 - (f_1 + f_4)) \div y_1$, equalling the negative value of $100 (-f_4) \div y_1$ which is also more plausible than the value given by Mr. Contet, since the tension on the counterspring works in the opposite direction of that caused by the load P to which the whole spring is supposed to be subjected. By inserting this corrected value in the subsequent equation one gets

$$100 (f - f_4) \div y = (P - 100 f_4) \div y_1$$

and by insertion of the value of 100 kilograms for P

$$(f - f_4) \div y = (1 - f_4) \div y_1$$

and the value for f_4 is found to be $y_1 (y - f) \div (y - y_1)$, in which f_1 but not f is eliminated. Continuing with this value on the plan followed by Mr. Contet, the value of Y, which with a load on the spring of 100 kilograms equals $f_2 - f_4$, is now found to be

$$Y = (fy_1 - f_1 y) \div (y + y_1) - y_1 (y - f) \div (y - y_1)$$

Possibly this equation may be simplified, but the variables remain in it, and it does not seem to support the otherwise so delightfully simple new theory.

In continuing his exposition of the qualities of a spring compounded with a counterspring, Mr. Contet dwells upon the action of the counterspring to moderate the strain of rebounds which in ordinary springs must be borne by the main leaf alone (an effect which may be obtained less perfectly by clipping one or more of the short leaves, near their ends, to the main leaf); upon the tendency of the counterspring to break up periodic oscillations of the main spring; upon the increased friction between the spring leaves which has the same effect as a shock-absorber working by progressive friction, and finally upon those ruptures of the main leaf which have taken place when countersprings were employed and which he ascribes to the extra load placed upon the main leaf by the pressure of the counterspring, causing it to work nearer to its elastic limit, as indeed it would if the practice of paring down the main spring when a counterspring is applied actually obtains.—ED.]

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NEW French Accessories—The combination of a gasoline filter and a secret gasoline lock is brought out under the name Vivax. It is intended to be secured to the outside of one of the frame reaches. Referring to the accompanying illustration, Fig. 1, the pipe from the gasoline tank is screwed on at A and the pipe to the carbureter at B. P is the filter through which the fuel must rise and to get to this filter it must pass through the opening L. Two slits M and N in the tubes D and F must register with L to make the latter opening accessible. Their positions are controlled by the disks E and G, upon whose circumferences the rings I and K are mounted secured by screws, and these rings are engraved with letters. With 15 letters on each ring only one out of 225 possible combinations in the positions of the two rings opens the lock for the flow of gasoline. The combination may be changed by turning one or both of the rings on their respective disks and securing them in new positions by means of the two screws and various threaded holes provided for this purpose in the disks. H is a stuffing box nut, also serving to hold the two tubular keys in their longitudinal alignment. The leaf spring J acting on the knurled edges of the lettered rings prevents accidental displacement, and the bolt holding it in place acts as a stopper in the drain through which accumulated impurities may be removed. The most obvious objection to the scheme of the device seems to be the ease with which the combination may be detected whenever the car is in operation, unless the driver gives it a twist at every trifling stop.

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A simple device for telling the content of a gasoline tank consists in a split tube made in two parts hinged together and pro-

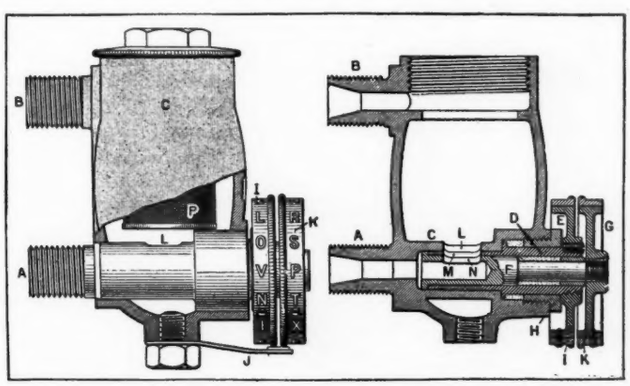

Fig. 1—Combination gasoline lock and filter

vided with a spring which tends to close the slit formed between its free edges. A float inside of the tube prevents the edges from meeting, however. When the tube is to be inserted in the gasoline tank to measure its content, the spring is compressed by means of a push button at the top of the tube, and the expansion of the tube releases the float, which drops to the bottom, where it is stopped by a lid secured to one of the tube parts. Upon insertion of the tube in the fluid, the float rises to the level of the latter and, when the spring is now released, it is held between the two tube-halves in the position given it. To make the instrument available it must, of course, be known to what content a given level of the gasoline corresponds.

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As fire insurance for automobiles is expensive and in some cases hedged with doubts, and as prevention at all events is preferable to cure, a suitable portable fire extinguisher has for a long time been considered an accessory which would meet the wishes of many prudent owners of cars. But the ordinary fire extinguisher, as used in buildings, is usually made of frail material, contains sulphuric acid and depends upon the mixing of two substances for the developing of fire-quenching gases. Most of all, it cannot be safely exposed to the shaking it would receive in a moving car. The Petrolex extinguisher devised in France consists in a metal bottle containing the active fluid ready for its work, and to the top of this bottle is screwed a faucet in which a conical valve with lateral ports opens an exit for this fluid through the faucet spout and at the same time brings pressure upon it by opening a channel connecting the interior of the bottle with the interior of a Sparklet phial secured to the top of the faucet. The Sparklet phial contains liquid carbonic acid gas and is of the same kind as those used for tire inflation.—From *Omnia*, Aug. 31.

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TIRES and Carbonic Gas—New light has been shed upon the question whether pneumatic tires may be inflated with carbonic acid gas—from a small bottle containing this gas in liquid form—without injury to the tire or risk of finding it deflated in short order by leakage. Laboratory experiments of older date on the diffusion of carbon dioxide through sheet rubber left the practical question in doubt, but recent tests by F. Steinitzer which are recorded in *Gummi Zeitung* this year are more nearly conclusive. A solution of 10 to 15 parts of glycerine and 20 parts of glue in 100 parts of water is recommended for producing a gas-tight coating on the inner surfaces of tire tubes. The tests related partly to the absorption of carbon dioxide by rubber and partly to the passage of the gas through rubber membranes, and it was found that different grades of rubber behaved very differently. As a rule, the purer grades absorbed much more of the gas than the mixed ones. The former became more or less tacky and lost from 12.6 to 27.5 per cent. of their tensile strength by exposure to the gas for a period of 5 to 8 days under a pressure ranging from 1 to 1.5 kilogram per square centimeter.

Where rubber washers are used to help in confining carbon dioxide their absorbent properties toward the gas are, on the other hand, found advantageous. P. Phillips reports in the other hand, found advantageous.

In the Steinitzer tests for diffusion through tire tubes the pressure used was 1 kilogram per square centimeter. Some time passed in all cases before diffusion began, after which it continued for 10 days with only slight abatement in the rate. As the samples varied not only in quality, but also in thickness the results are somewhat confused, not showing clearly whether the rate of diffusion is due to one or the other factor. A gray inner tube of poor quality and only 1.75 millimeter thick lost 4.90 cubic centimeters of gas in 36 hours through a surface of 22.3 square centimeters. The rubber in it had an admixture of 58 per cent. of mineral matter. A good black tube, 1.90 millimeters thick and containing 18 per cent. of mineral matter, lost 6.99 cubic centimeters. A good red tube, 2.15 millimeters thick and with 38 per cent. of mineral matter, lost 2.07 cubic centimeters, and a Best Para with only 12 per cent. admixture and 4.17 millimeters thick lost nearly as much, viz., 1.90 cubic centimeters. The time of exposure and the area tested were alike in all cases. Higher temperatures increased the diffusion.—From *Engineering*, September 6.

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GAS Regulation Without Moving Parts—The German-made Marvel carbureter is characterized (1) by having no adjustment of the air openings leading to the atmosphere, (2) by having a lining—24 in the illustration, Fig. 2—in the air channel surrounding the concentric nozzles, the thickness of which is varied according to the requirements of each motor, but not subject to adjustment after once fitted, and (3) by having the bottom entrance 9 to the outer annular nozzle 10 so subdivided and reduced that capillary effects retard the discharge from this nozzle when the discharge from the central nozzle tends toward its maximum by reason of high motor speed. By means of the latter provision the incoming air when moving at its highest velocity draws less gasoline than it would under ordinary circumstances, and thus the same result is attained as by automatic regulation of the air supply in other carbureters. The accelerator acts upon the rotary valve 15, which is shown in the illustration adjusted for starting the motor or runnning it idle. At this adjustment the mixture is drawn into the induction manifold through the small opening at 17 only, and the opening around the nozzle 8 is also contracted to a minimum, which is subject, however, to regulation by means of the screw 18. Even slow cranking draws air at high velocity through these small openings and therefore a rich mixture. A number of small holes, 11 and 12 in the drawing, are bored through the wall of the outer nozzle 10, 1 to 2 millimeters above the level of its fuel content. When the motor is sped up by turning the rotary valve, the first effect is to draw strongly from both nozzles, which makes the motor responsive, but at increasing motor speed the fuel in the outer nozzle falls to a lower level because the calibrated bottom entrance channels to this nozzle will not feed the fuel as fast as the holes at the top will discharge it, and then the central nozzle is functioning practically unaided. But at a reduction of the motor speed the fuel level rises again in the outer nozzle and it resumes its part in the action. The arrangement is plainly empiric and its efficacy must depend largely on preserving the capillary channels at 9 unclogged. In accordance herewith it is noticed that the gasoline enters the float chamber through what seems to be a triple metal gauze filter, marked 32, 33 and 34.—From *Automobil-Welt*, September 1.

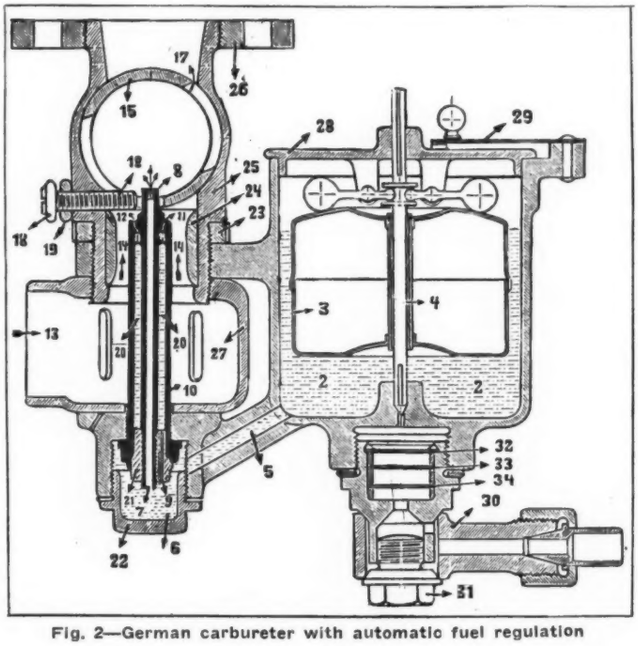

Fig. 2—German carbureter with automatic fuel regulation

Among the New Books

Recently Issued Works of Interest to the Car Builder—Deal with Grinding Work and the Principles of Efficiency

Rubber Trade Directory of the World Should Appeal to Tire and Accessory Manufacturers

IN the following book reviews, which are of interest principally to the manufacturers and students of the automobile, an outline of the contents is given together with remarks intended to bring out the value of the work and for whom it is particularly intended. Covering a broad field of allied industries as the automobile does, the books which are of interest to the automobile manufacturer as well as to the driver embrace nearly every field of science and research work. A few volumes which have recently appeared are reviewed below.

AMERICAN MACHINIST GRINDING BOOK, by Fred H. Colvin, Associate Editor, American Machinist, associate author of American Machinists' Handbook, etc., and Frank A. Stanley, Associate Editor, American Machinist, associate author of American Machinists' Handbook, etc. Published by McGraw-Hill Book Company, New York, 383 pages, 6 by 9 inches, with nearly 300 line cuts and engravings. Price, $3 net.

A compilation of data on a given subject by two men whose daily work brings them into contact with the subject-matter is bound to be of value where the work is carefully done. This seems to be the case in the American Machinist Grinding Book and the critical faculties of the authors give the volume an added value. The early chapters of the work are devoted to a description of the different types of grinding machines. These machines are profusely illustrated and the particular field for which each one is adapted is outlined. The machines are divided in to five groups. The first are intended for grinding cylindrical and conical surfaces; the second for plane surfaces and the third for cutters, tools and drills. The fourth and fifth include special portable apparatus. These are taken up and discussed at length and a clear insight into each is given. The remainder of the work is devoted to the actual work of grinding and many valuable kink will be found within its pages.

THE TWELVE PRINCIPLES OF EFFICIENCY, by Harrington Emerson. Published by The Engineering Magazine and copyrighted by John R. Dunlap, New York City. 423 pages, 4½ by 7½ inches, with diagrams. Cloth, $2.

An organization with clearly defined ideals, governed with common sense, aided by competent counsel, discipline of its units, fair dealings to others as well as to itself, maintaining reliable, adequate and permanent records, adherence to schedule, standardized conditions throughout and rewarding the efficient employees by direct compensation, will represent the modern idea of efficiency and system. The author makes each of the qualities of success which are outlined above the subject of an essay, citing facts and figures to further illuminate the points which are to be driven home. The perusal of this work is a study which cannot but be of benefit to any reader. Although one might not agree with the author in many of the minor points of the work where he seems to depart from the main issue, the book, taken as a whole, is filled with useful facts.

THE YOUNG ELECTRICIAN, by Hammond Hall, second edition, published by the MacMillan Company, New York City, 289 pages, 5 by 7 1-2, with numerous illustrations. Price $1.50.

Having no higher pretentions than the amusement of boys and at the same time presenting the subject in such a simple and interesting manner that the elementary principles of electric phenomena are readily grasped, this work should be a welcome addition to any boy's library. The first chapter tells of the early history of electricity, going back as far as the origin of the name, tracing it to Elekton the sun-god whose daughters wept themselves into poplar trees from which every year flowed amber which is possessed of electric qualities. Many other interesting legends are distributed throughout the book, giving an added interest to the phenomena which are described. Various electric machines and the methods by which boys can readily make them are also taken up, while a chapter on wireless telegraphy gives an insight into the fundamental principles of this important invention. It is not intended as a text book.

RUBBER TRADE DIRECTORY OF THE WORLD, compiled by the *India Rubber World* and published by the India Rubber Publishing Company, New York City. 314 pages, 6 by 9 inches. Cloth, $3.50.

This work is intended to place at the disposal of buyers for the home or export trade, full lists of the manufacturers of rubber goods in every country of the world, although special prominence is given to those of the United States and Canada. The directory should also interest manufacturers as it gives a list of makers of compounding ingredients and also the manufacturers of machinery used in the rubber industry. It also contains a mass of valuable data on the trademarks now adopted in the various branches of the rubber industry in the United States and Canada together with a chapter on trademark legislation.

Harking Back a Decade

FROM *The Automobile and Motor Review,* September 20, 1902:

For several years past the governments of France, England and Germany have been deeply interested in the testing and improving of all types of motor cars with a view to their use in field service. Touring cars are used for following the great annual army maneuvers and carrying dispatches and heavy tractors are being tested with a view toward their ultimate utilization for moving troops, stores and ammunition.

The Standard Oil Company has put into effect a new schedule of gasoline prices, the 76-degree grade being quoted at 14 1-2 cents a gallon in barrels, including both barrels and cartage f.o.b. New York. A rebate is made to dealers of 95 cents for each barrel returned, which amounts to about 2 cents per gallon. The company declares that the amount of gasoline used for automobile fuel is trifling compared with the commercial demand. Stove gasoline is 11 1-2 cents a gallon net, under the same conditions.

The use of the motor car by commercial travelers is still in its infancy, but there is no question that it will in time largely supplement the railways for this class of work. The small car having about 6 horsepower and weighing about 600 pounds is being introduced into this field with much success where it is necessary to cover territory not thoroughly served by railroads.

The committee in charge of the A. C. A. Reliability Tour from New York to Boston and return has issued its preliminary road charts giving a description of the itinerary to be followed. There are thirty entries already for the run, which is scheduled to start October 9. The total distance to be covered is 488.4 miles.

William K. Vanderbilt lost one of his front teeth during the running of the recent Paris-Vienna race. Mr. Vanderbilt was moving along at 65 miles an hour when a stone thrown up by another car struck him in the face and knocked out the tooth.

During the calendar year of 1900 the American production of automobiles totaled 4,192 cars, according to the last report of the Census Bureau. These were manufactured in 109 factories and the value of the product was placed at $4,899,443. Of the aggregate number made, those designated as gasoline cars were 936.

The Winton Bullet broke the 10-mile track record at the race meeting held in Cleveland September 16. The time made by the Bullet was 10:50 for the distance.

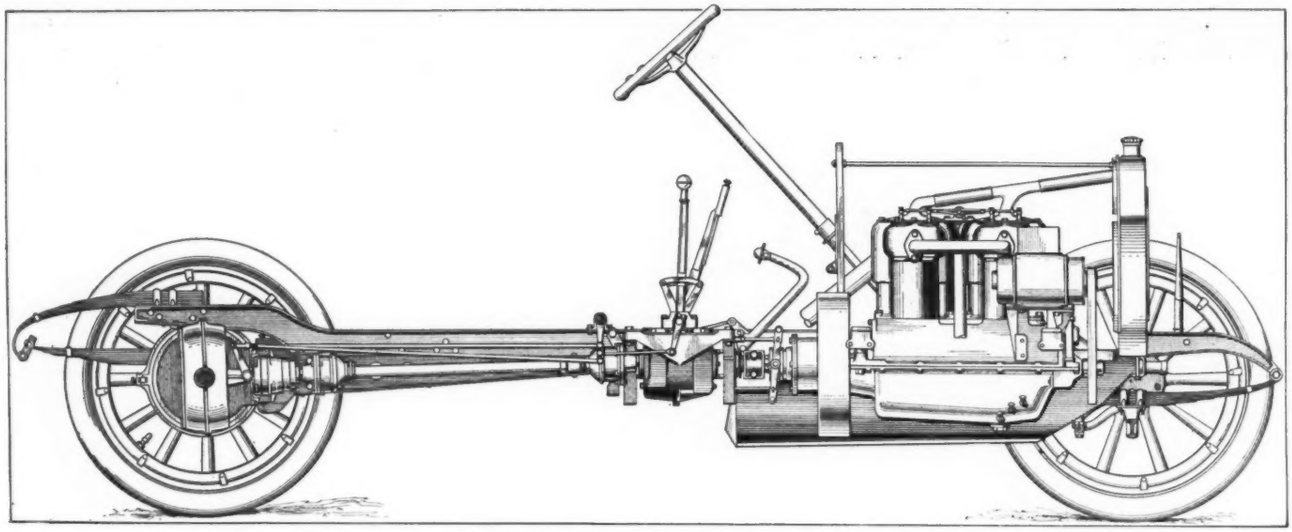

Fig. 1—Moon four-cylinder model 48 chassis showing arrangement of drive and control used on all three models

Moon Adds a Six to Its Line for 1913

Three Models Fitted with Electric Starting and Lighting Equipment to Be Placed on the Market for the Coming Season—Left Side Steering and Center Control a Feature—Mechanical Changes Few

AN entirely new departure for Moon practice is the building of a six-cylinder car. The motor of this type which will be marketed by this firm during the season of 1913 will be rated at 65 horsepower, it will be electrically started and will have an electric lighting equipment. It will have no crank attached to the front of the car. This latter feature will be common to all Moon cars for the coming season as will left-side drive and center control. There will be no difference in the mechanical details of the four-cylinder models, while the six will be a larger edition of the four-cylinder for last season.

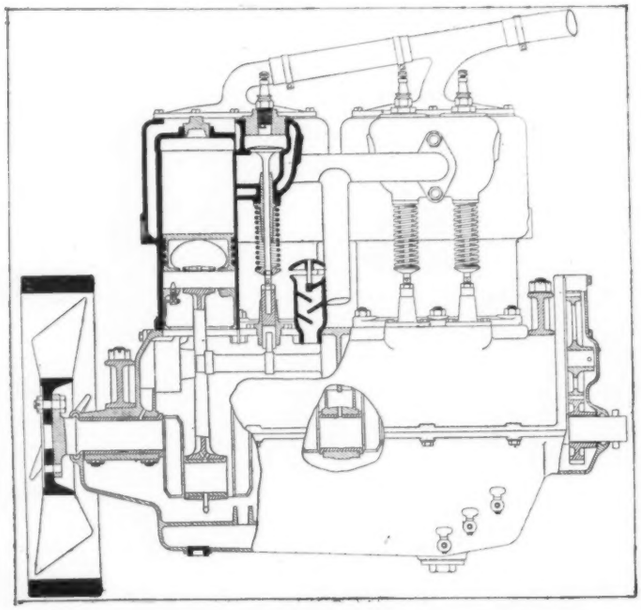

Fig. 2—Partial longitudinal section through model 39 motor

The Moon motors are all of the T-head type with the cylinders cast in pairs. The bore and stroke of the three models are as follows:

Model	Bore	Stroke	Horsepower
65	4 inches	5¼ inches	65
39	4 inches	5¼ inches	39
48	4½ inches	5 inches	48

These horsepowers are all developed at 1,500 revolutions per minute and are determined by the brake test. It will be seen that the models are named after the motors' brake horsepower.

The valves are 2 inches in diameter and have a lift of 3-8 inch. This allows for a rapid entrance and escapement of the gases, even when the motor is turning over at low speeds. The valves are of the regular 45-degree poppet type and are made in one piece of chrome nickel steel. They work on a cast-iron seating. The valve tappets and cam followers are of roller type. The roller followers are made as large in diameter as possible to eliminate wear to the greatest possible extent, both on the cams and on the followers themselves. Wear is also kept down at this point owing to the fact that the cams receive a liberal supply of oil through the oiling system of the car. The tappets and valve stem guides are bushed with phosphor bronze, giving hard and durable bearings with very good frictional qualities. The adjustment feature of the valve stems is the same as that common to most modern cars. Turning a nut on the valve stem just above the tappet guide will take up the wear resulting from actual contact as well as for the drop of the valve after grinding. Silence in the valve action is secured by a solid aluminum cover plate which incloses the entire action.

The pistons in all the motors are of gray iron. They have four rings, all mounted at the top of the piston above the wristpin. The wristpins are set near the top and the pistons in all models are made long. The wristpins are hollow and run in bronze bushings. The latter are lubricated by oil forced through them. The pistons are all interchangeable, being made

on automatic piston machines which turn them out in quantities. The wristpins are held solidly in position by a stud bolt fastened by a clip against the wall of the piston. They are thus prevented from working loose under running stresses.

Connecting-rods of I-beam are employed in all models. They are drop forged and bushed with Parsons white bronze bearing metal. The connecting-rod lower bearing caps are exceptionally strong and heavy and are held in place by four bolts. The diameter of the lower connecting-rod bearings is 1 3-4 inches.

The crankshaft of the Moon motor is 1 3-4 inches in diameter; it is of solid steel heat-treated, with the flywheel flange made integrally. In the four-cylinder models the total length of the main bearings is 11 1-4 inches. There are three main bearings in the four-cylinder models and four in the six-cylinder. These are supported by bridges in the upper half of the crankcase, the lower half being independent of the bearings and removable without disturbing the crankshaft. The grinding work on this part of the motor has a very small limit of tolerance, accuracy within .0005 inch being required by the inspection department. There is no key in connection with the crankshaft to the flywheel, the integral flange and the large bolts forming the only means of connection.

The camshaft and its connections are all one piece. This includes the shaft itself, the oil pump gear and the cams. This piece of metal is a drop forging given a double heat treatment under a secret process. The unit construction is more expensive, but the advantage claimed is greater silence owing to the impossibility of parts working loose. The camshafts are driven by a spiral gear train so designed that there are always three teeth in mesh. Lost motion is eliminated in this construction and exceptionally noiseless running assured. The load is distributed between the three teeth and the wear on the gears correspondingly lessened. The limit of tolerance on the gears is as small as that on the crankshaft. The final grinding in order to pass the inspection department must be within .0005 in. The lubrication of the gears is taken care of by the general lubrication system of the car.

The cooling system is taken care of by a circulating pump mounted on the left side of the motor. The waterjackets are of large size and a honeycomb radiator is used. Two features of the waterjackets are worthy of note, that is, the uniform thickness of the walls throughout, which will prevent internal strains due to the unequal expansion of the metal, and the extension of the waterjackets around the valve chambers. Owing to the T-head construction, it is possible to extend the waterjacket entirely around each valve and this has been done in the Moon motors. A drain cock placed on the bottom of the radiator is located at the lowest point of the cooling system and by opening this it is possible to remove all the water in the entire cooling system.

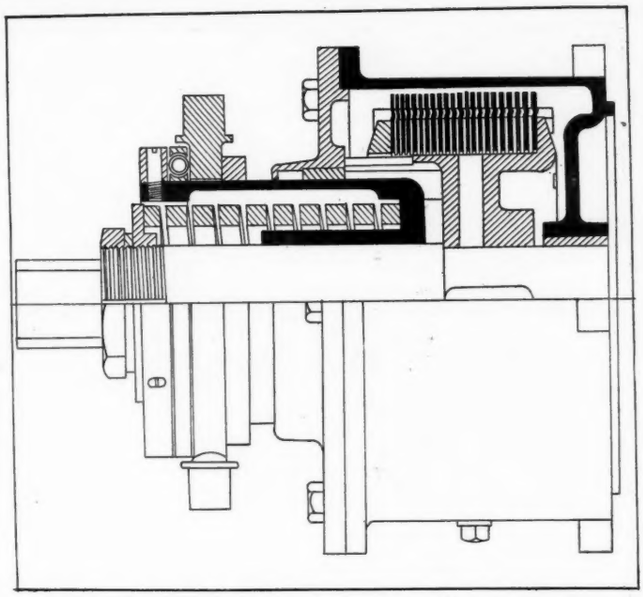

Fig. 3—View of clutch, showing spring, disks and housing

Lubrication of the Moon cars is accomplished in the same manner in the latest models as has been used in the Moon line for the past 6 years. The system is a combination of the force-

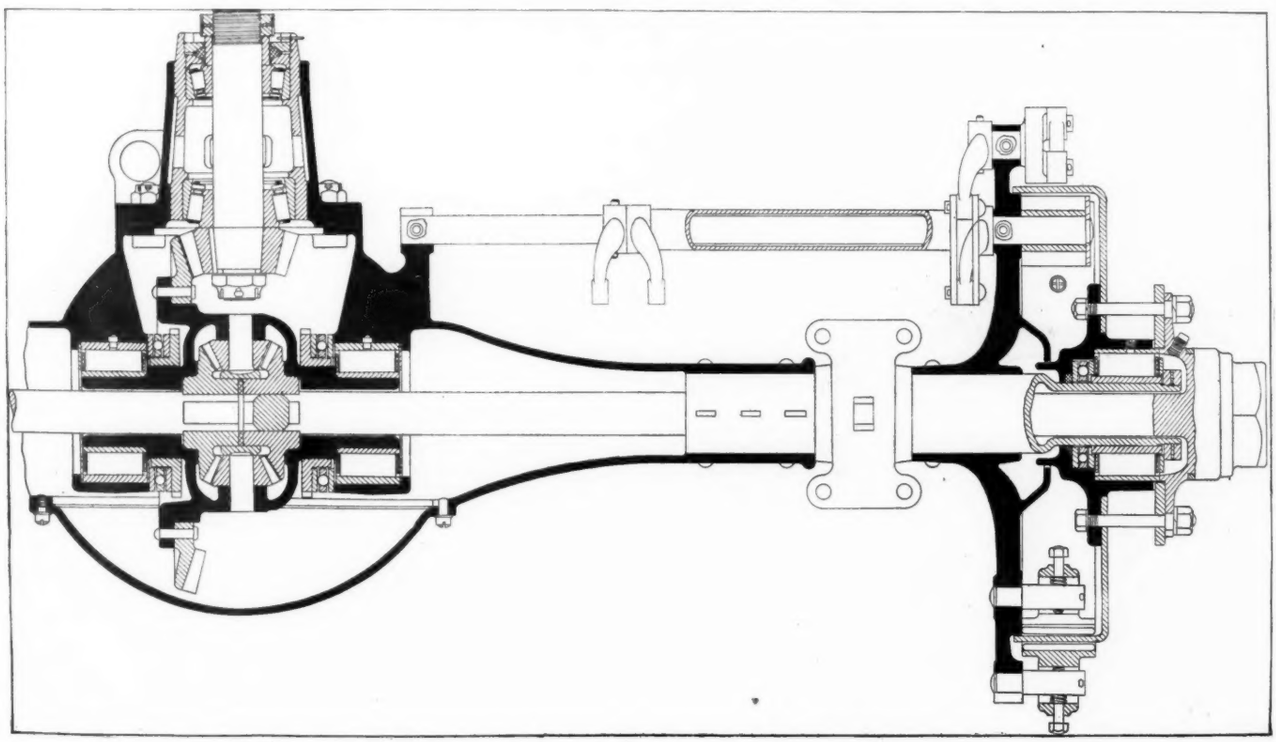

Fig. 4—Horizontal section through the rear axle. Note special Moon mounting of brake rod and ball and roller bearings in differential

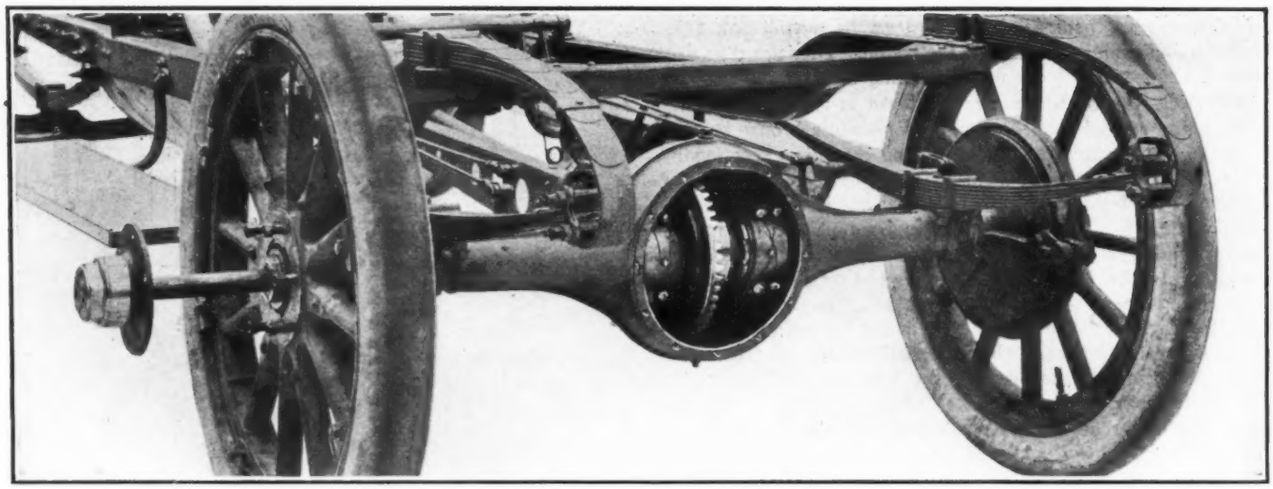

Fig. 5—Rear construction of the Moon 1913 rear construction showing torque member and differential

feed and splash systems. The oil is carried in the lower part of the crankcase. From the reservoir it is lifted by a circulating pump of the gear type driven by a vertical shaft from the exhaust camshaft. The oil is first led through a copper lead to a sight feed on the dash. All the oil passing through the lubrication system first passes through the sight feed so the driver is always aware of the quantity of the supply as well as the quality, for the oil turns to a dirty, brown color after it has been used too long in the crankcase and the observer can readily determine when the supply should be renewed. After leaving the sight feed on the dash the oil is led through independent leads to each main bearing. This assures the lubrication of these bearings immediately after the motor is started. After leaving the main bearings, the oil takes its course to the splash troughs in the crankcase just above the part that contains the oil. The troughs are separated from the oil reservoir by a horizontal partition which supports them. This partition is pierced by overflow holes to which the oil finds its way through standpipes so arranged that the overflow will not take place until after the oil has reached its proper level.

Lubrication of all the internal bearing surfaces of the motor, including pistons, connecting-rod bearings, camshafts, timing gears, etc., is taken care of by the splash of the connecting-rods in the pools of oil contained in the splash troughs. As the speed of the motor increases, the supply of oil is augmented in two ways. In the first place, the gear pump is driven at a higher rate of speed and thus furnishes a greater supply of oil to the main bearings and to the splash troughs and, in the second place, the connecting-rods will be moving more rapidly and the individual splashes into the oil pools will occur at lesser intervals. There are no adjustments necessary to the oiling system except that once a month the oil should be drained from the crankcase and a fresh supply put in. This is accomplished by means of a large drain plug located at the bottom of the crankcase. It is possible to tell very closely at any time the level of the oil in the crankcase by the three pet-cocks which are shown along with other details of the oiling system in Fig. 2. The first, or upper, cock should be opened. If there is no oil flow from here the others should be tried. The lowest cock is the danger point. If there is no flow from this cock the oil has reached a level which is unsafe for the proper lubrication of the car. The oil is poured into the crankcase reservoir through the large breather pipe located on the right side of the motor.

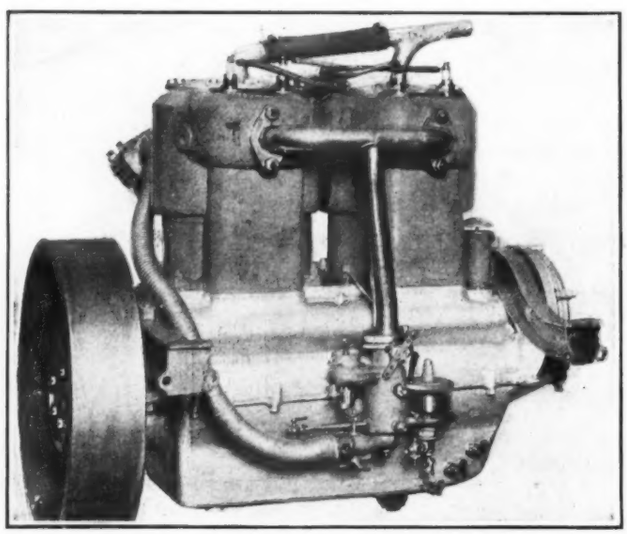

Fig. 6—Intake side of the Moon model 39 motor

The carbureter used with the 1913 Moon cars is the latest type Stromberg. This carbureter has independent adjustments for low and high speed and is hot-waterjacketed. Another feature of the carbureter is the hot air intake which allows the carbureter to draw in air which has been heated by the exhaust pipe, thereby eliminating to a large extent carburation difficulties in cold weather.

The electrical equipment of the car is in two independent parts. The two systems are the ignition outfit and the starting and lighting attachments. The former is the standard Bosch high-tension dual system. It is entirely independent of the starting and lighting systems, of which a short description follows:

The starter is built by the Wagner Electric Company, of St. Louis, and is known as the Moon-Wagner system. The system consists of a six-cell storage battery which are so arranged that the same electrical connections serve for charging as for discharging, that is, it is not necessary to connect the batteries in series for discharging and in multiple series for charging. The starting is effected by a motor weighing 60 pounds which is geared to the flywheel of the motor. When a button is pushed the current from the six-cell storage battery starts the electric motor and turns over the engine until it picks up speed under its own power. The motor is then automatically disengaged from the flywheel and after the car has reached a speed of approximately 8 miles an hour, the electric motor, which now acts as a generator, commences to recharge the storage battery. In a very short distance the storage battery is again stored up to its capacity. The batteries in this system are entirely self-regulating. There are no voltmeters nor ammeters to watch. The motor generator and its connections can be taken off the car by the removal of three bolts.

The multiple-disk clutch is shown in Fig. 3. The spring is of very generous dimensions, large in diameter and of square section. As may be seen, it is adjustable for tension by turning the nut on the end of the spindle. A ball thrust bearing is mounted at the end of the clutch shaft. The plates are of saw steel. There are twenty-three altogether and they are securely housed in a solid casing which is independent of the crankcase of the motor.

The gearset is of the three-speed type mounted throughout on annular ball bearings. The shafts are splined and the entire case is mounted in a solid aluminum casing. The use of aluminum throughout the Moon car wherever possible is intended to give as light a construction as possible and through the fact that aluminum is, to a large extent, a non-vibrating metal, the noise made by the gears is cut down to a minimum. A view of the gearset, looking forward, is shown in Fig. 7. The splined shafts and the relatively short distance between the bearing points may be seen in this illustration. The gearbox is supported by four strong arms cast integrally with the gearset housing. The gearbox is oiltight, a copper-asbestos gasket being fitted between the box and the coverplate.

From the gearbox, the drive passes through a universal joint to the propeller shaft and thence to the bevel gear differential. The differential may be partially seen in Fig. 5, which shows the rear construction and the axle with the differential coverplate removed. Timken roller bearings are used in the differential and the gears are made of large pitch with a factor of safety great enough to withstand a load three times as great as the maximum possible under any driving conditions. Adjustments on the bearings may be made without taking down the axle, but if necessary the entire differential can be removed from the rear axle housing through the opening left by the removal of the coverplate.

The axle construction is of the floating type and is designed and made by the Moon company. The housing is of one piece of pressed steel. The gears in the differential are of chrome vanadium steel heat-treated. The torsion member in the Moon cars is of exceptional strength. It is made of pressed steel in channel section and pierced by holes for the purpose of decreasing the weight without materially affecting the strength. The front end of the torque members terminates in a ball and is carried between two springs which cushion the shocks of the torsion strains.

The brakes are large in dimension. On all models the diameter of the drum is 16 inches and the face of the brakes is 2 1-4 inches. The brakes and the rear axle construction are shown in Fig. 4. The brakes are controlled through a cross-rod mounted on the rear axle frame. This cross-member is of tubular form and permits the linkage for the two sets of brakes to be carried to the drums through the tube. The clevises on the brake linkage may be taken up to compensate for wear at the point where the two sets of brake linkage are connected to the cross-member. A series of small oil drains in the rear axle housing permits the oil to flow from the rear system without letting it get as far as the brakes and thus cause these to slip. An equalizing bar is inserted in the brake linkage to allow of the same pressure being placed upon both brakes and to prevent excessive wear on one tire due to its taking up the entire braking load.

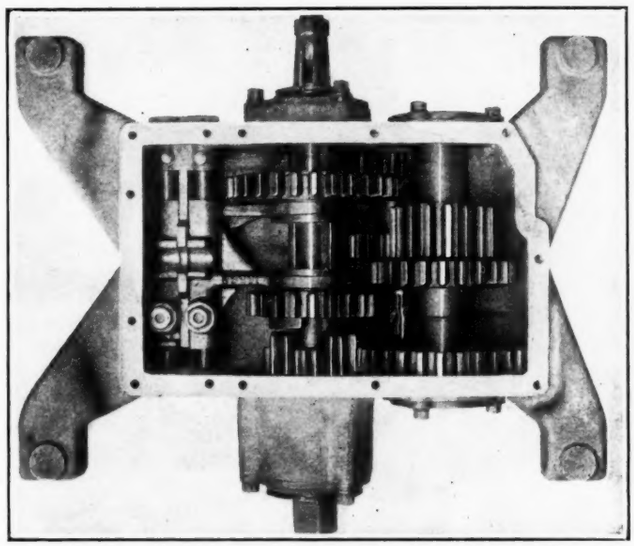

Fig. 7—Gearset with cover plate removed showing splines

Hot riveting is used throughout the frame construction. The cross-members of the frame are all gussetted heavily to prevent racking strains. At the rear end of the frame there is a kick-up to carry the side-members over the rear axle and at the same time to furnish support for the three-quarter elliptic rear spring. A semi-elliptic spring suspension is used in the front. All the spring shackles are provided with integral grease-cups, which provide adequate lubrication for these bearings.

The wheel sizes are the same on all three models, but the spokes are heavier on the wheels for the six-cylinder and larger four-cylinder cars. The wheels will be 36 inches in diameter and will be equipped with 4 1-2-inch tires. There are ten spokes in the front wheels and twelve in the rear. The spokes are 1 5-8 inches for model 39 and 1 3-4 inches for models 47 and 65. Demountable rims are a part of the regular equipment and an extra rim of this type will be furnished with each car.

A worm-and-gear type of steering is used. On all Moon models for 1913 this will be mounted on the left side and the control levers will be in the center. The steering wheel is 18 inches in diameter and is provided with a safety grip.

Full equipment will be furnished with the 4-48 and the 6-65, on the 4-39 the equipment is extra if desired. The equipment consists of top, windshield and speedometer. The top is of imported mohair, padded and made to fit the car neatly. It is furnished with side-curtains and a close-fitting dust cover. The windshield is nickel trimmed in black with rain vision, clear vision and ventilating features. The speedometer is of the latest type and combines a grade indicator with the regular speed and odometer features.

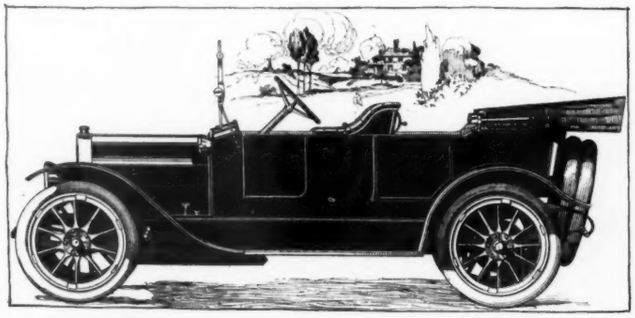

Fig. 8—Model 39 with five-passenger touring body

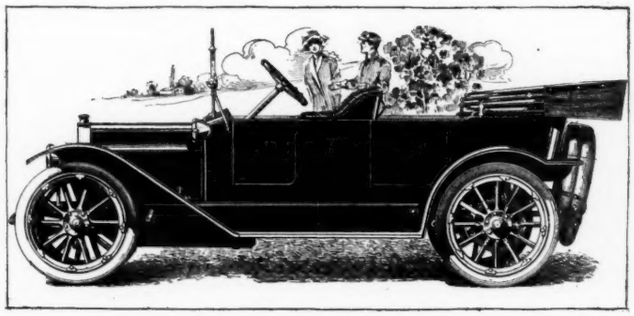

Fig. 9—Moon 48-horsepower five-passenger touring car

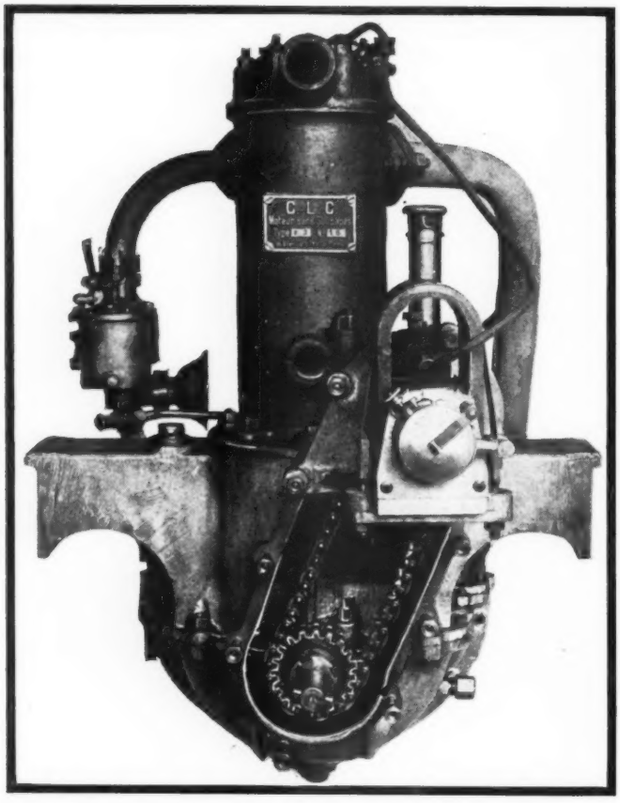

Fig. 1—C. L. C. rotary sleeve motor, showing silent chain drive

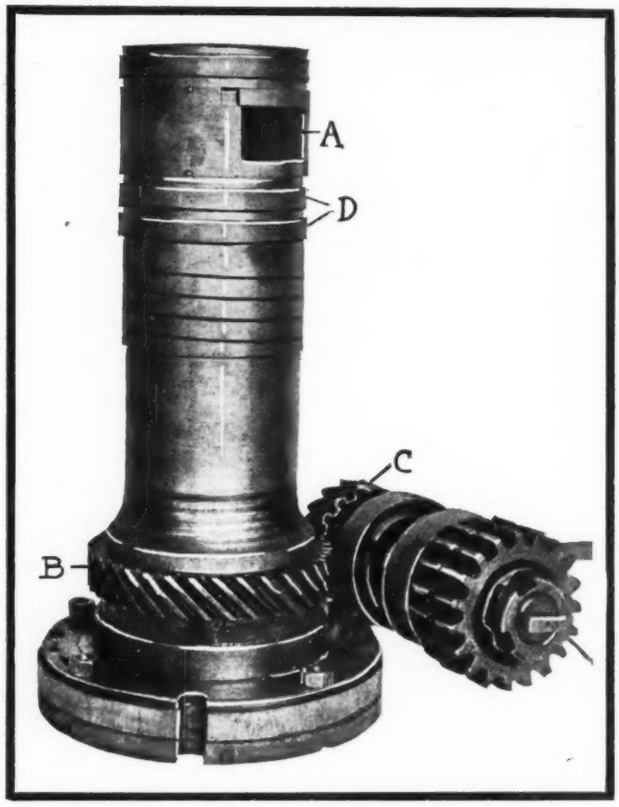

Fig. 2—Showing the drive of the rotary sleeve on the C. L. C. motor

Tests of C. L. C. Rotary Sleeve Motor

French Club Finds Rotary Sleeve Type a Success—Single Cylinder Develops 11 Horsepower at 2,188 Revolutions

PARIS, FRANCE, Sept. 3—Official power and fuel consumption tests have been carried out at the laboratory of the Automobile Club of France on a rotary valve motor built by the C. L. C. Company under Da Costa patents. The motor is a single-cylinder model of 3.1 by 5.5 inches bore and stroke having a cylindrical sleeve rotating at half engine speed. The sleeve carries one opening A, Fig. 2, which in its rotation covers and uncovers the intake and exhaust ports set at an angle of, roughly, 90 degrees from each other. The official tests lasted 1 1-2 hours, during which the motor was run from 1,882 to 2,188 revolutions per minute. At 1,882 revolutions the horsepower was 8.6; it increased to 9 horsepower at 1,952 revolutions; to 10.1 at 2,108 revolutions and the 11 horsepower at 2,188 revolutions. The oil consumption of the rotary distributor was 0.278 kilograms per hour. The total oil consumption could not be obtained owing to a leak. The cooling water remained between 60 and 75 degrees centigrade throughout the test, and according to the official report it was possible to maintain the hand on the part of the cylinder corresponding to the distributor throughout the whole of the time the motor was on the bench.

Since it was first introduced the C. L. C. motor has undergone a number of detailed improvements. Its sleeve, which is a gray iron casting fitting loosely in the cylinder, is carried on a combined radial and thrust bearing. Fig. 2. A gear B cut on the base of the sleeve receives a helical pinion C on a lay shaft obtaining its drive from the crankshaft by means of a Renolds silent chain. This shaft is carried on ball bearings and at its forward end drives the magneto by means of a dog clutch, while its rearward extension carries a pulley from which a belt transmits the drive to the mechanical lubricator. The sleeve is not relied on for gas tightness, this being assured by means of a deep compression ring having a rectangular opening corresponding with the intake and the exhaust ports and the opening on the sleeve. The ring has overlapping ends and is pinned on the sleeve in the manner often adopted for piston rings. This disposition allows a very wide tolerance in the fit of the sleeve within the cylinder, this tolerance having been increased, in certain cases, as high as 1 millimeter without any inconvenience. In ordinary practice, however, the tolerance is very much lower. In addition to the deep ring assuring gas tightness there are two ordinary compression rings D mounted on the sleeve below the opening and another one above it. These rings are pinned, having a stepped gap and are of greater depth than usually employed for piston rings. To assist in lubrication a spiral groove is formed on the outside of the sleeve and an oil lead is carried to the walls.

RESULTS OF OFFICIAL TESTS ON C. L. C. MOTOR

Model of Dynamometer	Size of Plates in Millimetres	Number of Hole	Temperature Degrees Centimetres	Atmospheric Pressure in Millimetres of Mercury	Revolutions per Minute	Indicated Horsepower	Corrections in Hundredths	Effective Horsepower	Fuel Consumption, Kilograms per Hour	Specific Consumption in Kilograms per Horse-power-Hour
3	105x105	7.5	21	760.5	2188	11.0	—4	10.56	2.480	0.235
3	105x105	8	21	760.5	2108	10.1	—4	9.70	2.424	0.250
3	105x105	8.5	21	760.5	2059	9.7	—4	9.31	2.364	0.254
3	105x105	9	21	760.5	2017	9.3	—4	8.93	2.348	0.263
3	105x105	9.5	21	760.5	1952	9.0	—4	8.64	2.264	0.262
3	105x105	10	21	760.5	1882	8.6	—4	8.26	2.200	0.266

Huber's Monopoly on Flexible Suspension

Patent Confronting Many Manufacturers Describes Specific Method of Mounting on a Three-Point Support

DETROIT, MICH., Sept. 16—The Huber automobile patent which is in the spotlight of the manufacturers at the present moment and under which some of Detroit's leading companies have taken out royalties relates to the suspension of the motor, clutch, and transmission mechanisms of a chassis on a sub-frame construction supported at three points, at the front center by a trunnion and at two rear points by a sliding support on the side members of the main frame. Fig. 1 reproduced from the patent papers dated August 25, 1905, Letters Patent No. 788,407 shows a plan view in which the two parallel sub-frame members SS support the motor, clutch and gearset mechanism. These two frame members are tied together at the forward end by a cross piece S1 which is supported by a trunnion S2 on the cross piece C of the main frane. At the rear these sub-frame members S attached rigidly to a frame cross piece T which rests upon the flanges of the side bars A of the main frame and are free to move fore and aft on these side members. At W1 is an elastic buffer between the cross member T and another cross member B, which latter is rigidly attached to the side members of the frame. This buffer keeps the trunnion S2 at the forward end of the sub-frame in engagement and allows a slight endwise movement of the sub-frame with the object of preventing destructive shocks. By not uniting the cross piece T to the side frame members any diagonal strains brought upon the main frame are not submitted to the sub-frame members S as the cross bar T is free to slide. Diagonal strains are resisted by angular braces U which bolt to the end of the cross bar T and extend diagonally forward and downward and are firmly attached underneath and beyond the flywheel H to a casting V, Fig. 2.

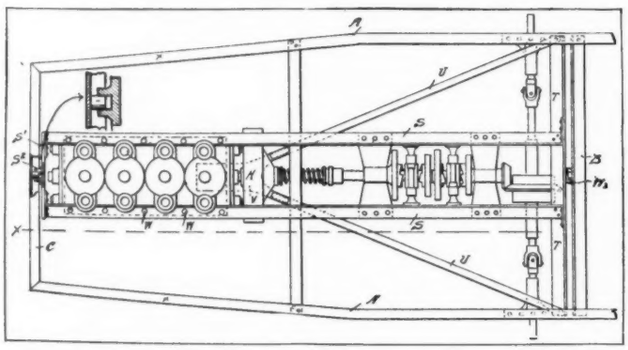

Fig. 1—Plan view showing suspension covered in Huber patent

The claims of the patent are:

1. In a vehicle, the combination of a main frame, a sub-frame rotably pivoted at its front end to the main frame and supported at its rear end by bearings resting upon but detached from the main frame, said sub-frame carrying the machinery of the driving mechanism, and whereby the twisting strains brought to bear upon the main frame are entirely relieved from the sub-frame and the machinery carried by it.

2. In a vehicle the sub-frame supported on three points, one of which is rotable in a perpendicular frame and the other two supported by the main frame, and diagonal braces running from the supporting points at the base of the triangle and to a common point in conjunction with the sub-frame substantially as described.

Electric Business Increases 45 Per Cent.

The fact has been noted that according to the latest figures available the electric vehicle business increased 45 per cent. in New York from July 1, 1910, to the same date in 1911, including, of course the growth of the commercial vehicle branch. During the past year an increase of 100 per cent. has been noted in the pleasure car sales of one company and since August 1, this concern has employed thirteen additional salesmen. The manager of the company said that prospects and indications all point to a much larger trade in the coming season. He says that he expects to double his sales.

In a general way the same story is told in other agencies. The Baker, Detroit, Rauch and Lang, Hupp-Yeats, Flanders and others have scored increases over 1911, the latter of course not being represented in the previous period and the Hupp-Yeats dating back only part of the year. Several agencies have been established in the past only to be abandoned, the latest example of that kind having been seen only recently.

Among the electric trucks an excellent business has been done for many years, the General Vehicle, General Motors, Studebaker and Lansden having a steady trade and several of the newcomers such as the Atlantic, doing a promising trade.

According to the New York dealers, the 1912 product is lighter, stronger, cheaper and much more satisfactory than the average product of former years. The radius of action is much extended. At present the dealers sell their cars on representations of from 65 to 100 miles on a charge.

This means that quite as much riding can be had in a day as the great majority of owners wish to take. Charging stations are more numerous and efficient than they used to be so that it is now possible to take long tours with an electric car.

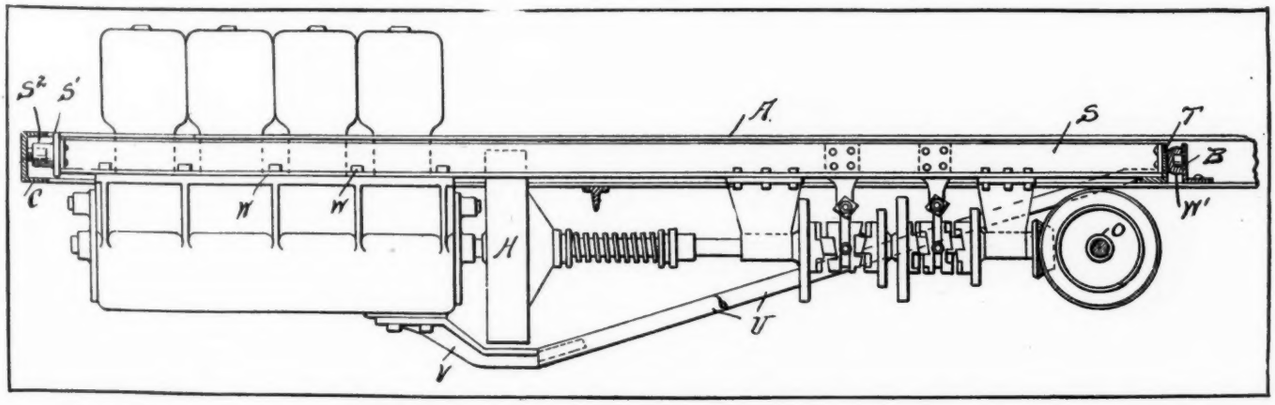

Fig. 2—Elevation showing braces designed to resist diagonal strains attached to a casting on the bottom of the crankcase

Car for Poor Mail Route; Various Motor Troubles Explained; Derivation of French Automobile Words; Cure for Motor Knock; Changing Gears in Two Ways; Suggests a Change-Gear Device; Poppet Valve Design

Wants Car for Bad Mail Route

EDITOR THE AUTOMOBILE:—We would like to get some advice as to the proper kind of a machine to be used on a mail route 22 miles in length. Twelve miles over an ordinary turnpike road, which is rather rough in places, the last 10 miles of the road is a steady climb up a mountain, the grade in some places being as great as 8 to 10 per cent. The road in places is rather rough, having many rocks in it; portions of the road, both on the level stretch and on the climb at times, when there have been rains, are muddy and rutted a good deal. When the weather is good, and the roads are dry, they are fairly good, but they are in their worst condition during the winter months when there is mud, snow and some ice on the ground, and also in rainy and muddy weather.

What is wanted is a machine that will cover this distance within a reasonable time—not necessary to have high speed, but a reasonable speed should be maintained. The load to be carried, in addition to the driver, would be the mail, consisting of five or six mail bags, sometimes rather heavy—possibly after the parcels post is put into operation the load would be still heavier. It would also be desirable to be able to carry one or two passengers in the machine should occasion require.

What we want to know is what type of machine you would recommend as best suited for the conditions above named.

Charlotte, N. C. A. H. WASHBURN.

—The vehicle which would probably suit you best would be a light delivery wagon of good construction. To secure the latter feature it will be necessary to pay a good price. It would be possible to secure a cheaply built car that would last for a short time, but it would be cheaper in the end to put more money into the car and get a vehicle that will stand the test of time. Wagons of 1,500-pound capacity are sold by a large number of makers who would be glad to make small modifications in the body so that two or three removable seats could be installed to take care of occasional passengers. This vehicle should have pneumatic tires of very substantial size so as to secure the maximum tire economy. If it is to be placed in the hands of a driver, it should be fitted with a governor that will not permit the speed of the vehicle to run above what the owner deems is safe. It is also suggested that the gear ratio be approximately five or six to one on the direct drive, that is, the highest gear.

Condition of Merrick Road

Editor THE AUTOMOBILE:—As many tourists are interested in the Merrick road, which runs along the south shore of Long Island, I would like you to tell me in what condition that road is at the present time.

Rondout, N. Y. E. P. MOORE.

—The Merrick road is very good except a few bad stretches where it is under repair. These are at Rockville Center, Amityville and Patchogue. Along the rest of the route the road is all that can be expected.

Cures for Several Troubles

Editor THE AUTOMOBILE:—Will you kindly give me the causes of the following:

1. A large quantity of smoke and a few explosions come out of my muffler.

2. When running on third speed my engine jerks a little and then stops.

3. Two of my cylinders do not explode because the vibrators stick to the pieces below them.

4. What does 40-45 H.P. 24.5 mean?

5. My magneto refuses to operate the engine.

My car is equipped with a Holley carbureter, sliding type transmission, Splitdorf four-cylinder coil and a Bosch magneto.

Watchung, N. J. A READER.

—1. You are using a mixture which is too rich. A section through the Holley carbureter is shown in the issue of September 19. This shows the adjustment point which is a knurled screw on the bottom of the carbureter. By turning this the mixture can be controlled and the smoke and muffler explosions stopped.

2. The reason your motor stops is probably because it cannot carry the load of the car on two cylinders which are alone firing according to your question No. 3.

3. Try a voltmeter on your battery current and see if it is 6 volts, which is the correct strength for the ignition system. File the vibrator contact points so they are flat and adjust on the adjustment screw until they vibrate properly.

4. It is difficult to say, but it is possible it is the rating of a motor which develops from 40 to 45 horsepower on the brake and has an S. A. E. rating of 24.5 horsepower.

5. This might be from most any cause and it is impossible to state without further details. It is recommended that you send the magneto to the factory where it will be placed in good condition at a very reasonable charge.

Derivation of French Terms

Editor THE AUTOMOBILE:—In view of the fact that there are several French words which have come into general use throughout the United States in connection with the driving and manufacture of cars it would be interesting to know their derivation and other interesting facts concerning them. There are three of these words to which I have particular reference and which I would like to see published in THE AUTOMOBILE together with their derivation and correct meaning. They are: chassis, tonneau and chauffeur.

Plainfield, N. J. JOSHUA T. LAMY.

—The derivations and plurals of these words as as follows:

(1) Chassis; plural, Chassis.

Derivation: French word signifying a frame of wood or metal; the frame work of a wagon. Later the term was applied to the frame work of a locomotive and then to the transverse and longitudinal frame members of the motor car. More cor-

rectly, however, the word chassis should only refer to the metal framework of the car receiving the motor, gearset and control mechanism.

(2) Tonneau; plural, Tonneaux.

Derivation: French word meaning a barrel; a wooden vessel formed of staves and hoops and made to contain a tonneau (1,000 kilogrammes) of oil. Later, a horse-drawn carriage, known in England as a governess car, having a rear entrance. A similar type of body was first applied to a motor car by M. Huillier, of Paris, and by reason of its resemblance to a barrel and to the horse-drawn tonneau already existing, was known as a tonneau.

(3) Chauffeur; plural, Chauffeurs. This word is always masculine in French, having no feminine form.

Derivation: From the French verb Chauffer—to heat. A chauffeur is a man in charge of a furnace or boiler fire. The first use of the word chauffeur was during the revolution of 1789 when bands of brigands heated (*chauffé*) the feet of their victims in order to make them reveal the place where their money was hidden. The chauffeurs were stamped out during the Consular period. The word chauffeur was first applied to automobile drivers under the popular supposition that they had to tend a fire. On the French railroads the chauffeur is the fireman, the engine driver is the mechanician.

Suggests Change Gear Device

Editor THE AUTOMOBILE:—I am sending a sketch (reproduced, Fig. 1) showing a suggested arrangement of the gears in the flywheel to provide for a change of speeds. The flywheel has three sets of cogs on its face for the purpose of giving the different speeds. The transverse shaft across the face of the flywheel carries the small pinions upon ball bearings. The shaft, as may be seen, is square between the pinions to allow them to slide into position to secure the different speeds. The cogs on the flywheel can either be made a part of the wheel or can be mounted upon it in some other manner. With this arrangement every speed would be a direct drive. Should it be desired the teeth could be omitted and the device made a friction drive. The pinions could be made hollow and the clutch could be of the cone type. The entire outfit can be housed within a tight casing and should be as silent as any type of drive. I would like to know what other readers of THE AUTOMOBILE think of the device.

Artesia, Cal. M. A. COOK.

—This device would never be of any practical value because the cross-shaft would be a point of weakness, in the first place. It would be difficult to get sufficient bearing space on the shaft to take care of the tremendous torque caused by the transmission of the entire motor power through the transverse shaft. When the high-speed pinion was in engagement there would be a noise that could be heard for blocks. The linear speed at which the periphery of a 2-foot flywheel travels at 1,000 revolutions per minute is over 6,000 feet per minute. The noise that would occur when the high-speed pinion came into engagement with the fast-running flywheel can be imagined. The arrangement would not be as compact as many of our three-speed boxes now in use and the distance between bearings would be greater. Changes of alignment in the propeller shaft would also not be compensated for as well as in the regular gearset. On the whole, it would not pay to attempt this type of gear change mechanism.

Mathematical Balance Possible

Editor THE AUTOMOBILE:—In reference to a statement in THE AUTOMOBILE of September 5, which, I believe, is not quite true, I would like to make a correction.

It is stated that "When measured mathematically the balance of a machine can never be perfectly determined because both primary and secondary forces and moments are involved, and, although the first may be reduced to zero, the secondaries can rarely, if ever, be nullified."

It is quite possible by mathematical calculation to determine accurately the balance of a crankshaft and if the theory and practice do not quite correspond, it is due to the fact that the crankshaft forging is not a true reproduction of the mathematically perfect balance crankshaft drawing.

As to the secondary forces and moments referred to by the author it is not correct that they can only rarely, if ever, be nullified, for the simple reason that a rotary mass can never produce a secondary force or moment. The secondary, fourth period and sixth period forces and moments which are present in a motor are due to the angularity of the connecting-rod and can be produced only by reciprocating masses.

It may be interesting to give a short explanation of these terms which are so often misused and which are so easy to understand without any special mathematical knowledge, if they are looked upon in the proper way.

In a standard four-cylinder motor it is apparent that when the piston turns the top dead point, the convexity of the imaginary circle, being just then swung by the connecting-rod, adds to that continuously described by the crank and that for this reason the deceleration of the upward movement and the acceleration in starting the downward excursion is more rapid than when the piston is turning the bottom dead point where the arc swung by the connecting-rod subtracts from that swung by the crank. Perceiving this, it is at once clear, as previously stated, that whenever two pistons are turning the top dead point and are supposedly balanced by two pistons turning the bottom one, the balance will not in fact be complete and the motor as a whole will jerk upwards. When one-half revolution has been performed and the pistons have changed places, the same thing will be repeated and there will be another jerk, not downwards but again upwards. Hence, since the motor cannot keep on continually going up, and must move down between these two jerks, it is apparent that it will vibrate up and down at a rate or periodicity twice as great as the speed of revolution. This makes clear the reason for the presence of the second harmonic force and moment.

Another effect of the angularity of the connecting-rod is that a piston going downward reaches its middle position before the crank has moved a full 90 degrees. It can again be qualitatively worked out on the basis of the physical conception without mathematics that at the 90-degree position there is a further unbalanced acceleration upward due to this cause, of which the maxima occur halfway between the upward jerks before referred to.

Thus it is apparent that with such a motor running at 1,000 revolutions we shall find that while there is no up and down

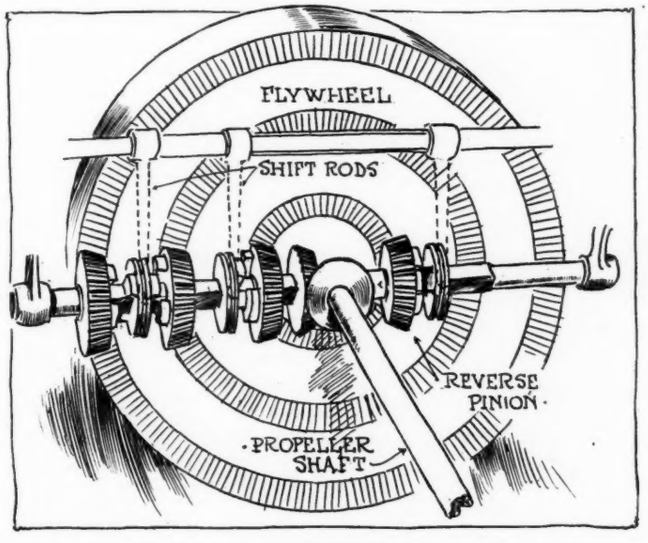

Fig. 1—Change-gear device suggested by a reader which is ingenious but not practical

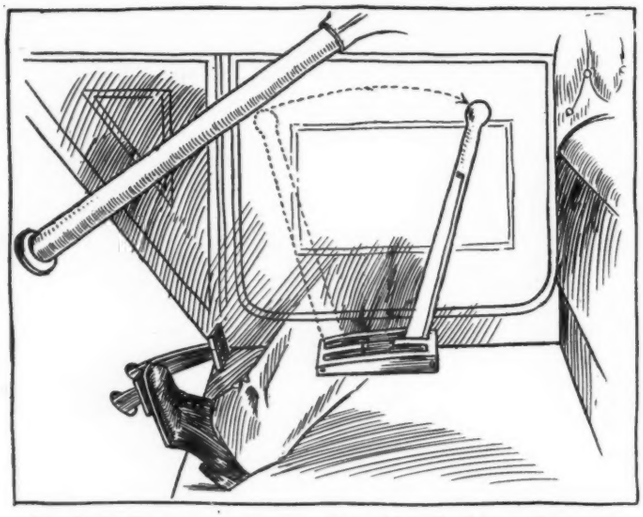

Fig. 2—Ordinary gear change. Straight pull of lever from one speed to next

vibration of a periodicity of 1,000 there is one at a periodicity of 2,000 and another one at a periodicity of 4,000.

The machine illustrated on page 508 of your September 5 issue seems to be a Norton running balance machine, which can only be used to determine if a crankshaft will give any vibratory moment, as the other disturbances which might be caused by the crankshaft—that is, the unbalanced forces—can be nullified by balancing the crankshaft on parallel ways, which has to be done before placing the same in the rotary balancing machine.

General Motors Company. ERNEST R. FRIED,
Research Engineer.

Engine Knocks on Hill Only

Editor THE AUTOMOBILE:—I have a four-cylinder touring car with a 4 by 4-inch motor. It is equipped with a Splitdorf magneto and Maxwell 1912 carbureter. The engine picks up very well on level ground, but when climbing a hill on high gear it does not take hold but dies right down with a knocking sound in the motor which sounds exactly the same as when traveling with a spark that is too far retarded. What is the cause for this and what is the remedy?

Spokane, Wash. TROUBLED.

—There may be several causes for the trouble which you mention. When the motor is on a hill if there is any tendency to knock at all it is there that it will surely develop. The troubles which are commonly the cause of a knock that develops on a hill and which is not perceptible on level ground are as follows: Lean mixture, magneto set too early, valves seat poorly, carbon in cylinders, poor valve adjustment, loose wristpin bushing, loose magneto shaft coupling, sticking valves and piston slap. The cures for these may be taken up in order. They are as follows:

Lean mixture can be cured by opening the needle valve slightly or by closing the air valve. The former is preferable as it is easier to make a correct fuel adjustment than an exact air adjustment. This adjustment should be made on the road. Take the car out on a hill and run it up in the condition that it is at present. Return to the bottom of the hill and make a change in the mixture by turning the fuel adjustment. When this is done run the car up the hill again and note if there is any decrease in the knock. If there is none or the change is only slight it is time to pass to the next cause.

The setting of the Splitdorf magneto is explained in detail in the issue of September 19, and it is only necessary to follow the directions contained therein to secure perfect timing.

Bad seating of the valves may be due to two causes. Carbon or other foreign matter may lodge on the seats and prevent the valves from seating properly, or they may be adjusted too closely so that they are not able to get down to the seats when the motor is hot enough to have caused the valve stems to expand. The latter would be apt to cause a knock on level ground as well as on a hill, however, and thus can be discarded from the list of probable causes. Carbon flakes on the valve seats are common, however, and may be the cause for the whole trouble. They can be removed by dosing the cylinders with kerosene or some other carbon remover and then turning the motor over to work the deposits out from around the valve seats. In case the valves are worn or pitted they will have to be reground.

Carbon in the cylinders is removed as just described. If patent carbon removers are used be sure to follow directions accompanying same.

Loose magneto shaft couplings are readily cured by tightening up the connections. Should an Oldham coupling be used in your car and it is found that considerable play occurs between the driving and driven faces, coat these with solder.

Sticking valves are caused by insufficient lubrication of the stems. A little oil will cure this trouble, which is not probable in your case as it would have been evidenced on level ground as well as on hills. Slapping pistons are due to excessive wear and are of such a nature that the repairs can only be made at the factory.

Difficulty in Changing Gears

Editor THE AUTOMOBILE:—In the issue of September 12 there appeared an article entitled, Changing Gears Without Noise, in which the contributor, Elmer E. Grove, gives a particular method for changing from high to intermediate which I have tried with success. Perhaps he, or some of your other readers would give their experiences when shifting to various gears and the different methods which they use under different conditions. This is always an interesting topic.

I find, for instance, that when shifting the selective transmission on the Buick from first to second speed it requires a lengthy stroke to push the lever diagonally through the entire length of the gate, passing through the neutral point during the operation. The result is that often the speed of the car diminishes to such an extent that the engine has to struggle to pick up the load smoothly. Is this due to incorrect handling?

2. What is the proper method of dropping from second to first speed on a hill so that the change is made without grating the gears?

New York City. JAMES WOOD.

—In making a correct change of gears, a knowledge of the car itself is very often a necessity, although if a knowledge of the principles and conditions involved is possessed by the driver, a great amount of trouble will be avoided. In spite of the fact that there is apparently nothing complicated about moving the change gear lever to the different positions in the quadrant there are several methods by which these changes can be made and each is best suited for one particular condition.

Assuming the car started and running on first speed, before making the change to second speed it will be necessary to have the car traveling at such a rate that the drop in speed during the length of time it takes to bring the gearshift lever from the first speed position, through the neutral gate and into the second will not result in the car traveling so slowly that there will be any difficulty in the motor picking up the load. It will not be necessary to attain a speed of more than 7 miles an hour to make this change on level ground. When a speed approximating this has been attained make the change by a smooth but quick pull on the lever. You should practice the movement to such an extent that the transverse movement in going through the neutral gate movement will be made so quickly that it will hardly be apparent and will not interrupt to a perceptible degree the smooth movement of the gearshift. In making the change to a higher speed it is necessary that the throttle be opened as soon as the gears are meshed. The spark is also at once advanced slightly.

In driving the car the motor is acting on a system of levers.

When running on low gear the effect is just the same as if the power was applied at the end of a very long lever. A greater effort is applied to the load, but the effort is applied more slowly. Changing the motor to a higher gear corresponds exactly to the shortening of the length of the lever arm and consequently takes more power to move the load. This is given by opening the throttle.

When the car is resting on a hill and facing upwards it is a little more difficult to be able to judge when the speed is sufficiently great to justify a change from first to second speed. The hill may be of such slope that it is an easy matter for the car to take it on high in ordinary running, but is still steep enough that the pause in the gearshifting act is sufficient to cause the speed to drop considerably. In a case of this kind the driver should be able to judge just at what speed he should throw out his clutch and make the change. The steeper the hill the greater will be the speed required before the change can be safely made. In going from second to high speed the same directions apply except that the complication of passing through the neutral gate is not present and therefore the change is simplified to a slight extent.

In dropping from a higher to a lower speed a different set of circumstances will arise and a different method will have to be pursued. Unlike changing from low to high, when dropping down it is possible to make an advantageous shift by moving the gearshift lever in two movements. This was brought out by Mr. Grove in his communication to THE AUTOMOBILE of September 12. When traveling through traffic it is sometimes desirable to change to a lower gear on level ground without slowing down the car. To attempt this by de-clutching and putting the lever directly into the lower speed notch in the same way that this is done while ascending a hill would be to invite a very noisy clash of the gears. Instead the change is made in three progressive steps, as shown in Fig. 3, and the speed of the car is not reduced to any appreciable degree. The first movement shown at A in the illustration is to disengage the clutch and to bring the shifter lever back to neutral. This leaves the car coasting with the motor running. The clutch is now let in and the levers are in the position shown at B. Now the part where the skill is required and where practice is necessary comes in. The motor is speeded up until it is turning over at the same rate of speed that it would be were the second speed engaged. It will take a little practice to accustom the ear to judge by the sound of the motor whether it is turning over at the correct speed or not. After the motor is speeded up to the proper degree, the clutch pedal is depressed, as shown at B, and the change gear lever brought into second speed. The same method will apply in going from second to first. On some cars a better change can be made this way than in the usual manner of bringing the lever straight through as shown in Fig. 2, where the usual manner of making a gear change is depicted.

Trouble in dropping to lower speeds on a hill can be averted if the critical moment at which to make the change is learned. If the driver waits too long he may stall the motor and sometimes place himself in a very serious position. If he tries to make the change too soon he will clash gears. By changing at the critical moment, however, an easy, quick change can be made.

Correct Lift of Poppet Valves

Editor THE AUTOMOBILE:—Would you please tell me how to calculate the lift of a poppet valve when the diameter is known and the area of the part through which the gases must pass has also been calculated? I would like to know the lift required for valves of the conical type commonly known as the 45-degree valve and also for the flat-seated valves. I am designing a motor to have valves of which the diameter of the seat will be 1 1-2 inches. The diameter of the pipe to which the valve opening must correspond in order to get the gases into the cylinder with a great enough velocity is 3 inches.

New York City. J. E. S.

—According to data furnished by the Society of Automobile Engineers the following formulæ have been worked out for the computation of the valve lifts for both the flat-seated and the 45-degree types of valves.

Taking D as the smaller diameter of the valve seat and d as the diameter of piping to which the valve opening must correspond, the ratio of these two, r, will be:

$$r = \frac{D}{d}$$

The formulæ for flat-seated valves are as follows:

When $r = 1$ Lift $= d \times 0.250 = D \times 0.250$
" $r = 1.25$ " $= d \times 0.200 = D \times 0.160$
" $r = 1.50$ " $= d \times 0.166 = D \times 0.111$
" $r = 2.00$ " $= d \times 0.125 = D \times 0.162$
" $r = 2.5$ " $= d \times 0.100 = D \times 0.040$

For cone-seated valves when the cone angle is 45 degrees the formulæ are:

When $r = 1$ Lift $= d \times 0.307 = D \times 0.307$
" $r = 1.25$ " $= d \times 0.256 = D \times 0.205$
" $r = 1.50$ " $= d \times 0.219 = D \times 0.146$
" $r = 2.00$ " $= d \times 0.170 = D \times 0.084$
" $r = 2.25$ " $= d \times 0.138 = D \times 0.055$

The above are theoretical lifts and an excess is left over these for wire drawing. This is especially true of the flat-seated valves where 25 per cent. over the theoretical lift is often allowed.

For a valve of the dimensions you have given, the lift for a flat-seated valve would be about 1-2 inch and for the conical valve about 11-16 inch, which would be very high.

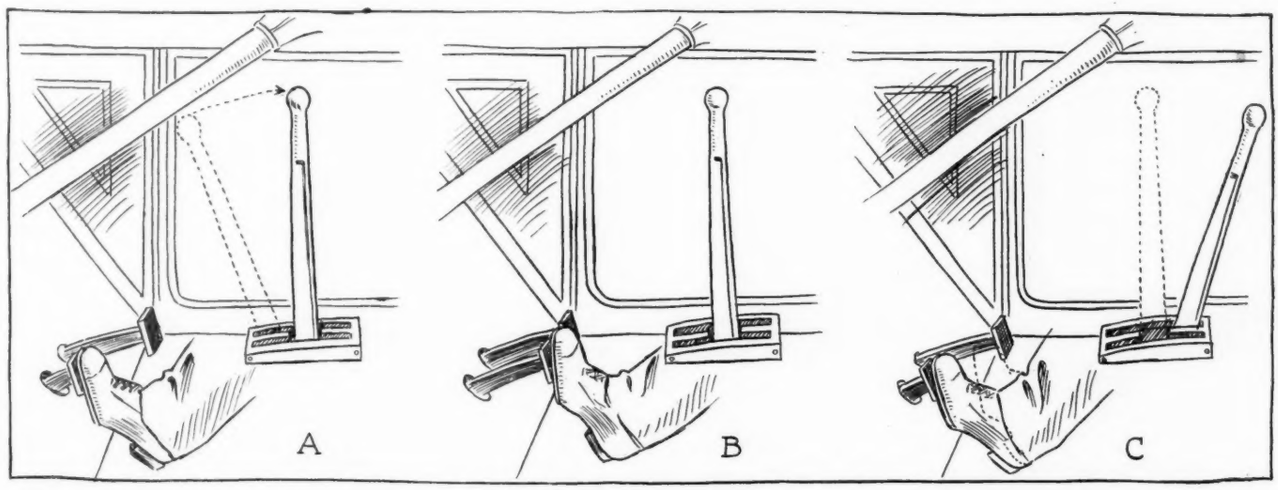

Fig. 3—Second form of gear change. A—Clutch out and lever brought to neutral; B—Clutch engaged with gears in neutral and motor speeded up to correspond to speed of car on low gear; C—Clutch out and gear change completed

Some Observations on Solid Truck Tires

Efficiency, Durability, Resiliency, Weight and Cost Determine the Value of the Different Makes

Tests at Different Speeds and Pressures Show That Tire Loss Varies Directly with the Load

THE object of this paper is simply to bring out some interesting points noted in studying the various types of truck tires on the market, the effect of load upon them and some rather peculiar characteristics. As my experiments have been confined to vehicles traveling at speeds below 20 miles per hour we have not considered pneumatic tires as entering the field. The various makes of tires now on the market may be divided into four distinct types.

Type A—Side Wire—Uniform compound throughout attached to wheel by means of cross wires embedded in rubber at base and secured to wheel by side wire or side flanges. Characteristic makes of this type—Firestone, Swinehart.

Type B—Wire Base—Uniform compound having several wires embedded in rubber at base running around wheel and secured to wheel by press fit on band and side flanges. Characteristic makes of this type—Diamond, Kelly-Springfield, Hartford.

Type C—Hard Rubber Base—Soft rubber tread, hard rubber base vulcanized to steel bands and secured to wheel by press fit and side flanges or T bolts. Characteristic makes of this type—Gibney, Goodrich, Polack, Goodyear.

Type D—Block—Separate blocks secured by cross or side wire and metal cages over blocks bolted through felloe. Characteristic makes of this type—Kelly-Springfield and others.

In considering the value of different makes of tires for use on commercial vehicles there are a number of features to be taken into consideration which will depend somewhat upon the type of vehicle on which the tires are to be used. These characteristics are: Efficiency, durability, resiliency, weight, cost.

In determining the value of the different characteristics to the truck manufacturer I have arranged these in the above order as representing the order of their importance to the manufacturers of electric vehicles.

In making observations a number of tests have been made on various makes of tires, the size used being 3 inches by 36 inches. This particular size was selected because of ease in handling, loading, etc. The standard load rating of this tire is 950 pounds, but tests were carried up to 1,500 pounds.

Efficiency—In rolling a wheel along the road over any surface there is a resistance to rolling depending on road surface and type of tire, which varies all the way from 3 pounds per ton with true steel wheels rolling on heavy clean rails up to the 200 pounds per ton in ordinary wagon wheels through sand.

The best authorities give the following figures:

Steel-tired wheels on steel rails..... 3 to 5 pounds.
Pneumatic-tired wheels on asphalt pavement..15 to 35 pounds.
Solid-tired wheels .....20 to 40 pounds.
Steel-tired wheels on average road, about .... 50 pounds.

In making tests on trucks with different makes of rubber tires results have been secured where the total resistance has run as low as 25 pounds per ton and as high as 60, all other conditions remaining the same except the tire. This is simply due to a variation in the compound of the rubber, the low results being with a very high quality of rubber, whereas the high results were due to an inferior compound. Of this the loss in transmission amounts to approximately 3 pounds per ton, friction and windage 5 pounds per ton, the remainder being in the tires.

In order to test for efficiency we make use of several methods:

First—by allowing the vehicle to coast down a grade and determine the distance it will run, this being repeated with different makes of tires. The more efficient tire will naturally coast further.

Second—Run the vehicle over a measured course and with electric instrument and stop-watch determine the power consumed per mile per hour, this being repeated with different makes of tires.

Third—The more accurate test has been with the use of a dynamometer on which the tire to be tested is mounted and rolled against a plain steel band. The resistance to rolling is determined in pounds at various speeds and pressures.

Fourth—The fourth and very simple method is to follow the system used in the Shore scleroscope for testing steel, which

NOTE—From a paper on "Some Observations on Tires for Commercial Vehicles" presented to the Philadelphia branch of the Society of Automobile Engineers by F. E. Whitney.

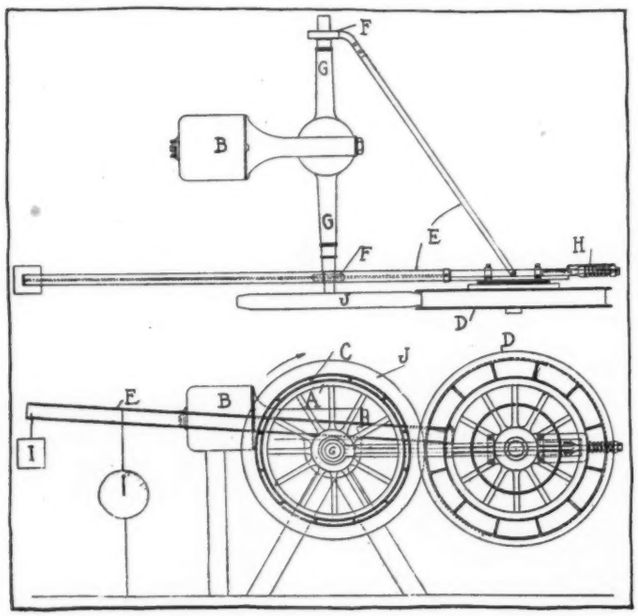

Fig. 1—Plan and elevation of apparatus for making tire efficiency tests

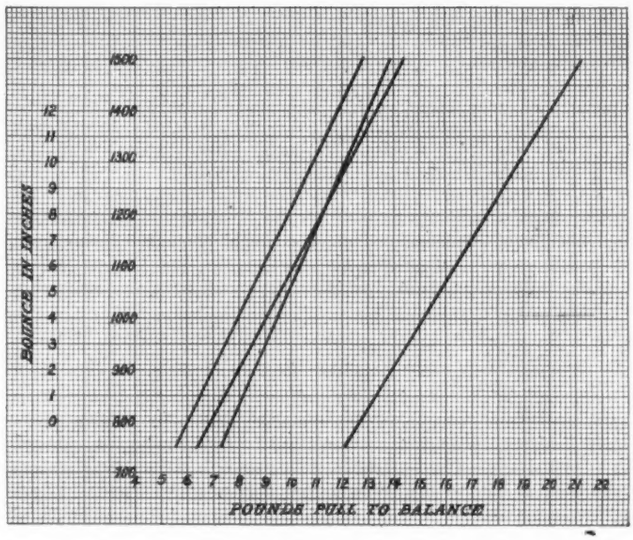

Fig. 2—Diagram of results of tests made on tires with the apparatus shown in Fig. 1

simply consists in dropping a piece of hard material on the tire from a definite height and measuring the height it will rebound, the efficiency of various tires comparing with the rebound.

Fig. 1 shows in plan and elevation an apparatus devised for making these efficiency tests. It consists of the rear construction of one of a worm-driven light delivery wagon. By means of a special driving shaft the differential is locked so that a wheel mounted on one end of the axle at A will be driven from the motor B in the same manner as the vehicle operating on the road. This wheel is made small enough so that a 36-inch tire mounted on its steel band will slip over the outside. The rim of this wheel is fitted with a number of set screws C, so that the tire can be readily centered and secured in position, after which it is securely wedged. Steel-tired wheel D, mounted on annular bearings, is carried by frame E so mounted that it swings readily on the annular bearings F of the axle G. The wheel D is mounted so that it can be moved in or out and it can be pressed against the wheel to be tested by means of the coil spring H. The wheel with its supporting frame is counterbalanced by the weight I. It will be seen that by revolving the wheel A in the direction indicated by the arrow with no pressure between the tire to be tested J and the wheel D, there will be no tendency to rotate the whole apparatus about the center of the axle G. When, however, pressure is applied any resistance or drag at the surface of the tire J will be resolved into a tendency of the whole system to rotate about G and this is determined in pounds pull by means of the spring balance K. In addition to the apparatus indicated the wheel is fitted with a speedometer so that tests at different speeds can be made. In this manner a range of tests has been made at varying speeds and pressures and the results plotted in curves, Fig. 2.

As a direct comparison with the above method of test, the bounce in inches of the same tires has been plotted, as shown at the left side of Fig. 3, from which it will be noted that tire 6 shows a bounce of 8 1-2 as against 4 1-2 for tire 3, showing about the same relative efficiency with the different method of test.

As indicating the effect on the mileage secured from one charge of the battery in an electric truck with the extremes as indicated by tires 3 and 6, a vehicle equipped with tire 6 would cover, say, 50 miles on one charge of the battery, whereas a vehicle equipped with tire 3, over the same route, and using the same battery equipment would be able to cover only 30 to 35 miles.

The amount of cushion which the tire interposes between the wheel and the road is an important factor in the value of the tire as measuring the amount of injurious vibration and shocks which are absorbed. In order to determine this effect tires were given various loads and observations taken of the compression of the tire; also of the area in contact with the road. From these observations curves have been plotted showing the load characteristics of various makes of tires and also the contact with the road and the load per square inch of the surface in contact.

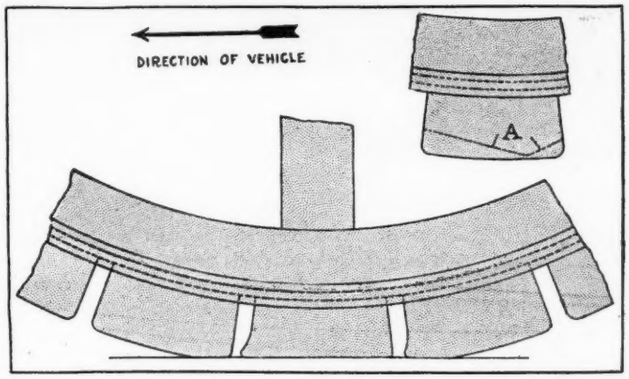

Fig. 3—Showing how the toes of block tires creep out from under the load and, at A, the shape resulting from long service

Fig. 4 shows a series of curves in which the deflection of the tire in sixty-fourths of an inch is plotted against load in pounds. This test is made by pressing the tire between two parallel surfaces and simply measuring the compression in inches. On curve 3 with a load of 1,250 pounds a compression of 16-64 is shown as against 24-64 on curve 4. In other words, on a bump tire 4 will compress 50 per cent. more than tire 3, and, consequently, absorb proportionately more vibration.

In Fig. 5 pressure is plotted against pounds. In Fig. 6 pressure per square inch is plotted against pounds. The area in contact with the road varies with the different makes of tires from 8 6-10 to 11 3-10 square inches.

I have shown in Fig. 3 the effect which is obtained with block tires. It is interesting to note that usually the heel of the blocks is worn out first, but, as a matter of fact, the toe is worn more on account of its creeping out from under the load as the wheel revolves. The dotted line A indicates the shape the blocks assume after having been in service for some time.

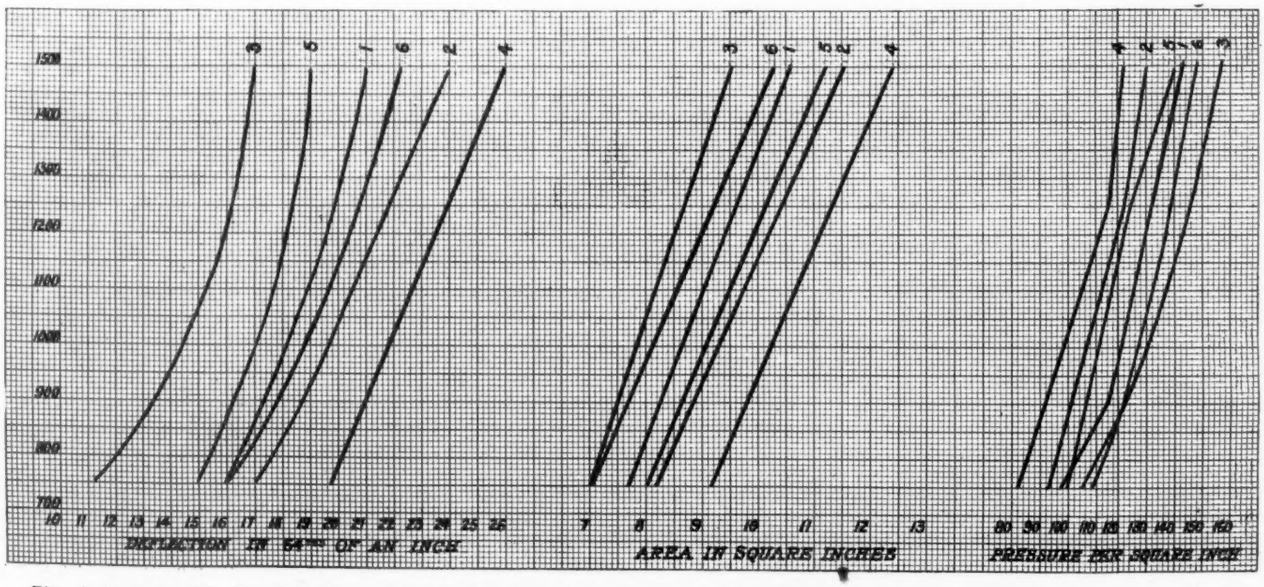

Fig. 4—Curves with the deflection plotted against the load in pounds. Fig. 5—Showing pressure plotted against pounds. Fig. 6—Pressure per square inch plotted against pounds

Alco truck, the first to cross the continent with a load of merchandise, passing a 20-horse freighter in an uninhabited mining district

Transcontinental Alco Finishes Run

Averages 44.09 Miles a Day for 94 Days — Weather and Road Conditions Very Trying

AVERAGING 44.09 miles a day for 94 days, the Alco 3-ton truck which started from Philadelphia with its rated load of merchandise has reached its destination at Petaluma, Cal. The road conditions and weather were extremely trying during a large portion of the run. There were cloudbursts in the desert states where rain is a novelty in summer and the extreme of everything had to be endured by the vehicle and travelers.

In the state of Iowa, where good roads and easy conditions generally might be expected, the crew had to inspect 500 bridges and strengthen 100 of them so that the truck could pass over them. In the far West dynamite had to be used to blast a path for the truck to cross some of the mountains.

After crossing the Missouri into Nebraska, better conditions were found and these prevailed until the truck ran into a series of terrific rainstorms in the western desert country.

Up to the time of reaching Julesburg, Col., the truck covered 2,184 miles in 24 days.

This is an average of 92.66 miles a day and an eloquent plea for better roads through the intermountain section, because the final results show that the average for the whole trip was about half the average daily mileage to Julesburg.

Wyoming proved a nightmare but in Utah, despite the heavy grades, much better road conditions were found. Nevada proved to the satisfaction of everybody concerned that it is no nice place to run a truck. In the first place there are no roads worthy of the name and in the second, the trails were so narrow and the curves so abrupt that dynamite was needed to make it possible to turn the truck around some of the projecting rocks. Between Elko and Austin, the progress was slow, climbing one grade 6 miles long that is said to average 20 per cent.

The course then lay southward through Reno to Carson City and thence up the main wall of the Sierras, rounding Lake Tahoe in the crest of the range. This climb was very severe on account of the steepness of the trails. From the California line to Folsom City the road was good but was largely up and down until after the second range of mountains was passed. From Folsom through Sacramento to San Francisco the truck traveled over boulevards.

Records of the time-measuring and distance-measuring instruments covering the run from Philadelphia to the Lucin cut-off at the north arm of Great Salt Lake are now available. The running time each day on the average was 10 hours, 29 minutes. The average actual operation was 5:21 per day and the average number of stops, per day, 25.

The longest day's run was August 8, when the truck was kept on the road for 20:03 but only traveled for 3:28, making forty-one stops.

The shortest day's run was 1:27, on July 27. The day's run in which the largest number of stops was made was July 20, when 100 were recorded on account of the weak bridges in Iowa.

While the general average of the whole trip is placed at 44.09

Blasting the rocks on a narrow mountain trail

Forging along more than 10,000 feet above sea level

Negotiating a boulder-strewn pass in the Desatoya range

per day, deductions are not allowed for Sundays, when the truck did not run as a rule. No allowances, however, were made for the days when it was impossible to run the vehicle for reasons beyond the control of the crew. By making allowance for the Sundays, and non-operative days, the average daily mileage during actual running is raised to 55.26. This makes the total mileage 4,145.

Cost figures of the trip have been kept in much detail and when the tabulations have been completed they will be presented.

The truck carried two drivers and was in charge of E. L. Ferguson as official pilot.

The trip was the first of its kind ever undertaken in that the load carried was regularly consigned freight routed via the truck instead of some other means of transportation.

The chief lesson learned by the experience of the trip was that it is possible to ship freight in that way, but that in point of time, the truck can not hope to equal transcontinental railways. In fact, that element of the problem was not considered in making the trip. The unprecedentedly bad weather conditions were purely incidental and the fact that the truck prevailed over them shows simply that weather will not stop the automobile truck where it can get traction and does not run into an immovable obstruction.

The most striking testimony of the trip is an affirmation of the chief lesson taught during the military maneuvers in Connecticut last month with regard to the weakness of bridges. The big car was stalled hundreds of times during the long run while its crew shored-up suspicious culverts and bridges and extricated it from the bottom of some creek after treacherous bridges let it down.

Captain Ferguson reports that many of the worst specimens of medieval bridges are being replaced with stone and concrete culverts, particularly in Iowa, and that subsequent trips across the continent will be made without such a grave complication as beset the Alco.

The car will be shipped back to Philadelphia and will resume its work in the service of its owner.

Alco crew picking the road to Eureka, Nevada

Calendar of Coming Events

Shows, Conventions, Etc.

Sept. 23-Oct. 3	New York City, Rubber Show, Grand Central Palace.
Sept. 30-Oct. 1	New York City, Sales Managers' Convention, Automobile Board of Trade.
Jan. 2-10	New York City, Importers' Salon, Hotel Astor, Importers' Automobile Alliance.
Jan. 4-11	Cleveland, O., Annual Automobile Show.
Jan. 11-25	New York City, Thirteenth Annual Show, Madison Square Garden and Grand Central Palace, Automobile Board of Trade.
Jan. 20-25	Philadelphia, Pa., Annual Automobile Show.
Jan. 25-Feb. 1	Montreal, Que., Automobile Exhibition, R. M. Jaffray, Manager.
Jan. 27-Feb. 1	Detroit, Mich., Annual Automobile Show.
Jan. 27-Feb. 1	Scranton, Pa., Annual Automobile Show, Hugh B. Andrews.
Feb. 1-8	Chicago, Ill., Annual Automobile Show.
Feb. 10-15	Minneapolis, Minn., Annual Automobile Show.
Feb. 17-22	Kansas City, Kan., Annual Automobile Show.
Feb. 24-Mar. 1	Omaha, Neb., Annual Automobile Show.
Feb. 24-Mar. 1	St. Louis, Mo., Annual Automobile Show.
March 3-8	Pittsburgh, Pa., Annual Automobile Show.
March 8-15	Boston, Mass., Annual Automobile Show.
March 17-22	Buffalo, N. Y., Annual Automobile Show.
March 19-26	Boston, Mass., Annual Truck Show.
March 24-29	Indianapolis, Ind., Annual Automobile Show.

Race Meets, Runs, Hill Climbs, Etc.

Sept. 29-30	St. Louis, Mo., Track Races, Universal Exposition Company.
Sept.	Washington, D. C., Reliability Run, Automobile Club of Washington.
Oct. 7-20	Chicago, Ill., Reliability Run, Chicago Motor Club.
Oct. 21	National Tour American Automobile Association.

Proposed Contests

Sept. 28	Indianapolis, Ind., Track Races, E. A. Moross.
Sept. 28	Kalamazoo, Mich., Track Races, Inter-State Fair.
Oct. 4-5	Sioux City, Ia., S. C. Auto Club and Speedway Association.
Oct. 4-5-6	Peoria, Ill., Track Races, J. A. Sloan.
Oct. 12	Springfield, Ill., Illinois State Board of Agriculture.
Oct. 12	Salem, N. H., Track Meet, Rockingham Park.
Nov. 6	Shreveport, La., Track Meet, Shreveport Automobile Club.

The Automobile

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Large-Diameter Tires

JUDGING from a 2000-mile road test on which 7-inch pneumatic tires were used on a car with loads weighing over 5000 pounds it is certain that tires of this diameter are going to receive much more attention than they have up to the present. Several cars have been equipped with tires of this diameter, tests with them have been made over rough roads, and in every case the judgments given have been uniform, namely, that they are a big improvement in many respects over smaller sizes.

Instead of using a pressure of 75 or 80 pounds per square inch as would be used on a 36 by 5-inch size pressures of 40 pounds are possible with a 7-inch size on the same diameter of wheel. Using so low a pressure greatly reduces the possibilities of blowout, due to temperature rises in hot weather, and so adds to the period of usefulness of the tire. The large-diameter tire has been introduced because of its resilience due to the much greater distance between the wheel rim and the tread of the tire.

With the large-diameter tire a much larger rubber surface is in contact with the ground at all times and this results in a reduction in skidding as compared with smaller tire sizes running at much higher air pressures. In actual tests this anti-skidding factor has been much greater than first imagined and drivers consider it one of the merits of the large-diameter tire.

Front-Door Policy

Surroundings Influence Results

THE atmosphere of the business offices of an automobile factory is reflected in all of the manufacturing departments—it permeates every department from raw stock to the final assembly.

The slovenly factory head has his office more like the corner of a stockroom than a manager's sanctum. Disorder is its chief characteristic. The business units are promiscuously positioned around the room; the window blinds are at varying heights; submitted accessories or other units that should find a resting place on the shelves of the engineering department are strewn over the floor; the manager's desk bears close resemblance to a scrap pile in a foundry yard, it contains broken pieces of car parts, selling orders, parts orders and a score of other things; in a word, the entire room breeds a feeling of utter lack of business, and, while at heart the business executive may be a Napoleon, the influence that his surroundings have on those who come in contact with them cannot possibly be salutary.

Visit the factory and in not a few departments the same lack of system is apparent. The machine shop is ill-kept. Instead of cuspidors beside the various machines, the workmen are left to their whims; the floors are not regularly swept, and when cleaned it is only a semi-cleaning; raw stock, instead of being neatly piled at convenient places to await its going through the miller, the lathe or drill press, lies around in disorder; racks for carrying small parts to be machined and other racks, on which the workman can place them after machining so that he has not to move away from his machine or stoop to pick parts off the floor, are entirely wanting; several machines instead of being erected on substantial bases are poorly mounted, reducing their efficiency and, perhaps, the accuracy of their work; adequate provisions are not made for properly lighting the factory so that in the early fall and winter the efficiency percentage of the workman is sadly reduced because of lack of good light; poor ventilation is general; often machinery is not mounted with the aim of greatest economy of space, greatest lighting capacity, greatest ventilation and minimum handling of material—**from Alpha to Omega it is a poorly arranged, poorly conducted factory—every department in it reflects the dominating shortcomings of the management.**

Careless environments engender careless workmanship: It is not surprising in such a factory to find a high percentage of discarded parts due to over-allowances. The very atmosphere of the factory breeds such a condition. Men in such a factory work at much lower capacity than in a highly-organized and efficiently-conducted plant. Contrast the assembly work on a car in such a plant with that done on another make of car in which environments are so different. Contrast the workmanship with that in a plant where workmen on careful parts are required to wear white linen or cotton coats in order to impress on them the importance of cleanliness and accuracy. Contrast the

work with that in a factory where the floors are kept clean every hour of the working day, where ventilation is looked after, where light falls upon the work at the correct angle, where individual towels are furnished for the workmen, where the entire atmosphere is order, cleanliness, brightness and system. **The result shows in the work, it exhibits itself in the manufacture of every part entering into the make-up of the car, it exhibits itself in the assembly of the car parts, in fact, it exhibits itself in every component part of the machine.**

A man's work cannot be any better than its creator. If the man is ill at ease, his work will be unreliable. If the worker operates in orderly surroundings, he will instinctively put the best there is in him in his work. The highest efficiency—which incidentally is economy in its strictest sense—can only be had as a result of the supreme effort which is the result of suitable surroundings. The investment, on the other hand, by which these effects are brought about, is comparatively small and pays for itself immediately and at a very high rate of interest.

Country's Fire Chiefs Meet in Convention at Denver

(*Continued from page 622*)

let the contract for twenty-eight tractors. Sixty-one new companies are being organized fully motorized. Instead of stables the stations are garages.

In illustrating the dependability of the tractors in the Passaic service, Chief Bawker stated that during the 18 months in which they have been pulling the trucks, there has not been a time when the alarm has sounded that there has been trouble in starting, and when started the tractors have always arrived at and returned from the fire without trouble or delay. There are some very steep hills in the city of Passaic but the tractors make 8 miles an hour on the steepest of them.

Bad Weather Has Little Effect

In the winter season when snow and ice cover the streets it does not interfere to any extent with the operation of the tractors. In one instance, Chief Bawker states, it snowed continuously for 24 hours when an alarm was turned in from the hill section of the city. A speed of 15 miles an hour was made through streets unbroken by traffic. The best horses could have done under similar circumstances would have been 5 miles per hour.

With tractors doing so well it is to be expected that apparatus in which the motor is on the same truck would do as well or better in snow and ice, for in the latter type the weight is on the driving wheels, where it should be to give traction.

According to Geo. C. Hale, Fire and Water Commissioner of Kansas City, Mo., a motor-driven three-way combination got to a fire and handled it through 26 inches of snow when all the horse-drawn equipment became irretrievably stuck. With chains on all four wheels and the load helping to give traction these motor-driven pieces can go through storms that horses cannot face.

For experiences in snow, one would imagine Calgary, Can., to be the city offering the most rigorous conditions, but James A. Smart, chief of Calgary's fire department, says that the snowfall is not great but is very dry and often drifts to a depth of 2 or 3 feet. He has had in use for the past three winters a 40-horsepower squad wagon and during that period has never been tied up and never failed to reach a fire under any weather conditions.

Mr. Smart believes that motor-driven apparatus has the advantage over horse-drawn apparatus wherever the use of wheels is possible and only in the use of runners has the horse-drawn apparatus the questionable advantage, for in severe storms horses will not face the average blizzard of the Northwest, and the motor will. Under light flaky snow, Chief Smart says he has seen 75 per cent. of the horses fail in attempting to reach a fire on asphalt pavement up a slight grade, that the motors negotiated without difficulty. The Society for the Prevention of Cruelty to Animals never had a spasm at seeing a motor standing facing a blizzard.

There is not the unanimity of opinion in regard to the availability of the gasoline motor as a pumping engine that there is as to its advantages as a propelling unit.

Chief Magee, of Dallas, Tex., allows but one man to look after his motor pump and permits no one else to lift the hood. He cites one long stretch of work which proved the reliability of the motor pump to his satisfaction. After getting the pump to the fire in record time the motor pumped water for three lines of hose for 17 1-2 hours and for one line of hose for 3 hours longer. The operators of the Dallas motor pumps number three to each pump and work on three shifts. One of these is called the chief engineer.

Motor pumps as distinguished from steamers have not yet proven their entire reliability to the complete satisfaction of many fire engineers, who hold that though the gasoline engine is the best method of getting the pump to the fire, the steamer is the better for doing the pumping. One of the reasons advanced by the adherents of the steamer as a pump in conjunction with the motor as the propeller, is that it is asking too much of the gasoline engine in its present state of imperfection, to expect entire reliability for hours of steady work at top load after it has been pushed to get the pump there in the shortest possible time. Adherents of the motor pump say that if the motor is looked after and operated by a competent man, and by that man alone, there need be no fear of premature exhaustion of the motor from overwork.

Frozen Hydrants a Problem

Another objection against the motor pumps is that with the present arrangements their exhaust gases cannot be used to thaw out frozen hydrants as is done with live steam from the boiler of the steamer. In answer to this, those who uphold the motor pump say that when the hydrants are properly installed and looked after, they will not freeze. Nevertheless, hydrants do freeze, and some means must be provided to thaw them out. Chief Kenlon urges the use of electricity in the same way as it is employed on water pipes and even suggests that the motor pumps carry with them an arrangement of some sort for utilizing the power lines and lighting mains. Chief Ringer, of Minneapolis, states that alcohol in the quantity of about a pint thaws the hydrants in a short time. Means for thawing hydrants with motor pumps is a question that the makers will have to solve.

There is another point in which motor pumps of some types at least are weak, although makers are waking up to the fact. As pointed out by George W. Booth, chief engineer of the committee on fire prevention of the National Board of Fire Underwriters, in his paper presented last week on the efficiency of the motor pumping engine, the chief reasons for the breakdown of motor pumps during service is the continued running at high speed. It is the opinion of all the engineers who have observed tests of motor pumping engines, that these machines should be provided with high-powered motors.

Branch managers and salesmen of the Fisk Rubber Company, Chicopee Falls, Mass., assembled during their recent conference

FISK Salesmen Hold Conference—From September 9 to 14 branch managers and salesmen of the Fisk Rubber Company, Chicopee Falls, Mass., were in conference at the factory. This conference ended at a clambake, and the above illustration represents the sales organization of that company.

Clarke with Chalmers Company—J. I. Clarke, formerly with the Boston "Post," has taken a position in the advertising department of the Chalmers Motor Company, Detroit, Mich.

La France Company's Bulletins—The American-La France Engine Company, Elmira, N. Y., makers of motor fire apparatus, is issuing monthly bulletins which give valuable advice to city officials who are contemplating the purchase of fire trucks.

Indianapolis Collects $25,000 on Licenses—Approximately $25,000 has been collected by the city of Indianapolis, Ind., so far this year for motor vehicle licenses. Until this year the annual fee was $3 and the amount raised last year was $7,800.

Columbus Club Fighting Ordinance—The Columbus Automobile Club, of Columbus, Ohio, will make every effort to secure the repeal of the recent ordinance that provides that an automobile while passing a street car discharging passengers must come to a full stop.

Omaha's Automobile Floral Parade—Many entries are being received for the automobile floral parade to be given in Omaha, Neb., during the Ak-Sar-Ben festivities early in October. A number of neighboring towns have expressed their intention of entering cars.

Drawback on Gear Duty—Under a ruling of the Treasury Department at Washington, D. C., a drawback of duties will be allowed under section 25 of the tariff act of 1909 on gears imported in the rough and finished by grinding and polishing by the Gear Grinding Machine Company, of Detroit.

Y. M. C. A. Has Automobile Class—The Y. M. C. A. of Columbus, Ohio, in order to teach the intricacies of the automobiles to business men has started a class which meets every day between the hours of 12 M. and 1 P. M., which is quite popular among the business men of the Buckeye capital.

Havens Resigns from Abbott Firm—C. E. Havens has resigned his position as manager of the technical and service department of the Abbott Motor Company, Detroit, Mich., and is taking an extended vacation in an effort to recover his health. Mr. Havens was at one time connected with the Hudson Motor Car Company.

Indianapolis Club's Road Activities—An appropriation of $2,000 has been made by the Hoosier Motor Club of Indianapolis for the fund being raised to buy the material for building a rock road from New York to San Francisco. The club has endorsed the plan, as has the Indianapolis Commercial Club. The club on September 28 and 29 will give a sociability run to the farm of George Ade, at Brook, and to Kentland. A reception will be given by the Commercial Club of Kentland to the club on the evening of September 28. Those making the trip will spend the night at Kentland.

New Headquarters for Baker Brothers—The Baker Brothers Motor Company, Buffalo, N. Y., formerly located at 846 Main street, have moved into the building at 1227-1229 Main street which was formerly occupied by the sales department of the E. R. Thomas Motor Car Company, which concern recently went into receivers' hands. Although originally constructed for the display of automobiles, the Baker company has had the entire showrooms remodeled and the 1913 Cole car, of which the Baker Brothers Company is local agent, is now on display in the new building.

Novel Use of Stearns Car—D. M. Clark, of Prescott, Ariz., road superintendent of Yavapai county, is transforming his 40-horsepower Stearns car into a road-building utility. The rear seat has been discarded and replaced with a big air compressor. This apparatus will be driven by power from the auto's engine and attached thereto will be a big mine drill. When the remodeling is complete the automobile drill will be used in boring on the Copper Basin Road, which is to be widened and repaired. It is expected that it will be very valuable in rock work. Mr. Clark plans to patent his invention.

New Agencies Established During the Week

PLEASURE CARS

Place	Car	Agent
Albany, N. Y.	Hupmobile	Park Garage Co.
Albany, N. Y.	Lozier	C. S. Ransom
Albany, N. Y.	Stutz	Northern Motor Car Co.
Aledo, Ill.	Moon	E. B. Miller
Baltimore, Md.	Cutting	Baltimore Garage Co.
Bradford, Pa.	R-C-H	Smith Agency
Calgary, Alberta	KisselKar	H. H. Kerr
Carbondale, Ill.	KisselKar	Chas. F. Hamilton
Charleston, Mo.	Moon	Luke Howlett
Chicago, Ill.	Great Western	Deibler Motor Car Co.
Chicago, Ill.	Ohio	Mattoon Motor Co.
Circleville, O.	Hudson	Mader Auto Co.
Columbus, O.	Alco	M. P. Murnan
Columbus, O.	Cadillac	Curtin-Williams Auto Agency
Louisville, Ky.	Cole	Miles Auto Co.
Columbus, O.	Hudson	Hudson Sales Co.
Columbus, O.	National	C. E. Ross
Coshocton, O.	Imperial	Standard Auto Co.
Pittsburg, Pa.	Ohio	Ohio Motor Sales Co.
Columbus, O.	Overland	O. G. Roberts & Co.
Columbus, O.	Stearns	O. G. Roberts & Co.
Decatur, Ill.	Moon	North Main St. Garage
Detroit, Mich.	Lozier	Grant Brothers Auto Co.
Fort Plain, N. Y.	Franklin	Alphonso Walrath Co.
Harrisburg, Ill.	Moon	Chas. V. Parker
Indianapolis, Ind.	Abbott-Detroit	Andersch Brothers
Jersey City, N. J.	KisselKar	B. & H. Garage
Kinderhook, N. Y.	Studebaker	George H. Brown & Bro.
Lawrence, Mass.	R-C-H	Lambert Morin Mot. Veh. Co.
Logan, O.	Hudson	Gage Auto Co.
Louisville, Ky.	Franklin	Younger Auto Co.
Marion, O.	Hudson	C. C. Stoltz
Marinette, Wis.	KisselKar	Myron R. Churchill
Memphis, Tenn.	Moon	Chickasaw Motor Car Co.
Milford, Mass.	Oakland	William H. Baker
Milwaukee, Wis.	Imperial	Imperial Auto Sales Co.
Mineral Wells, Tex.	KisselKar	L. M. Dunn
Montreal, Que.	KisselKar	J. D. Lapoint
Newark, O.	Hudson	Charles W. Stevens
New Rochelle, N. Y.	KisselKar	H. A. Fuller & Co.
Pekin, Ill.	R-C-H	O. L. Cottingham.
Phoenix, Ariz.	KisselKar	Wesley A. Hill
Punxsutawney, Pa.	Moon	G. Frank Porter
Ravena, N. Y.	Studebaker	Snyder Bros.
Regina, Sask.	KisselKar	D. L. Boureau
Rice Lake, Wis.	R-C-H	Crisler & Co.
Rosenberg, Tex.	Moon	Rosenberg Motor Car Co.
Salina, O.	Hudson	Nickel Co.
Salisbury, Md.	KisselKar	L. D. Collier
San Angelo, Tex.	KisselKar	W. A. Bell
San Francisco, Cal.	Regal	Frank O. Renstrom Co.
Seattle, Wash.	R-C-H	I. D. Lundy Co.
Sheboygan, Wis.	Rambler	Erie Garage Co.
Sioux City, Ia.	Moon	Bennett Auto Sup. Co.
Springfield, O.	Abbott-Detroit	Dunbar Motor Car Co.
Springfield, O.	Elmore	Dunbar Motor Car Co.
Springfield, O.	Overland	Dunbar Motor Car Co.
Springfield, O.	Palmer-Singer	Blue Ribbon Garage
St. Johnsbury, Vt.	KisselKar	Percival & Silsby
St. Louis, Mo.	Moon	J. D. Perry Lewis
Syracuse, N. Y.	KisselKar	George Finck
Tacoma, Wash.	Stearns-Knight	American Auto. Co.
Taylor, Tex.	Moon	Prewitt Auto Co.
Temple, Tex.	R-C-H	J. E. Brown
Texarkana, Ark.	Moon	Paul Jones
Toledo, O.	Moon	Moon Sales Co.
Toledo, O.	Paterson	J. W. Banting
Wibaux, Mont.	Franklin	Wibaux, Mont.

COMMERCIAL CARS

Boston, Mass.	Daimler-Mercedes	R. L. & H. H. Smith Co.
Columbus, O.	Gramm	O. G. Roberts & Co.
Elyria, O.	Sanford	Edward E. Critz
Lynn, Mass.	Chase	Sibley & Green
Lynn, Mass.	White	Sibley & Green
Manassas, Va.	Sanford	F. A. Cockrell & Co.
Montreal, Que.	Sanford	Francis Hankin & Co.
Norwich, Conn.	Sanford	F. O. Cunningham
San Diego, Cal.	Sanford	P. M. Price

ELECTRIC CARS.

Springfield, O.	Krebs	Dunbar Motor Co.
Milwaukee, Wis.	Flanders	Kopmeier Motor Car Co.
Milwaukee, Wis.	Detroit	Smith-Hoppe Auto Co.
St. Louis, Mo.	Flanders	Colonial Auto Co.

Secures Arizona Essenkay Agency—R. Alyn Lewis, of Phoenix, Ariz., has secured the Arizona agency for Essenkay.

McWhirter Manager Rubber Company—H. D. McWhirter has been appointed acting manager of the Winnipeg Rubber Company, Winnipeg, Canada.

Haines Company Moves—Carroll A. Haines & Co., Baker electric distributers in Philadelphia, moved September 15 to their new and larger salesrooms at No. 1927 Market street, Philadelphia, Pa.

Page Joins Accessory House—Wallace G. Page, for many years connected with the Shawmut Tire Company as sales manager, has become associated with George S. Van Voorhis in the American Marine Equipment Company, 27 Haverhill street, Boston, Mass. This company has built up a large business selling automobile tires and supplies.

Mapping the Pasear Tour—The photograph shows the caravan of Studebaker cars used by Californians in laying out a model trip for tourists who will visit the 1913 exposition at San Francisco, Cal. The cars made the trip of 2,000 miles without repairs or adjustment to their machinery. The photograph was taken at Jawbone Pass, overlooking Mojave Desert.

New Boston Baker Quarters—F. N. Phelps and A. F. Neale, representing the Baker Motor Vehicle Company in Boston and surrounding territory, have taken new headquarters at No. 801 Boylston street. Mr. Neal is one of the Baker Company's oldest pleasure car dealers. F. N. Phelps represents the truck department of the Baker Motor Vehicle Company in a large part of New England.

Hear Sermon in Automobiles—To compete with the motor car, as he expresses it, the Rev. Louis Magin, pastor of First M. E. Church at La Crosse, Wis., is trying the experiment of holding outdoor services, the steps of the church being used as the pulpit. All motorists of La Crosse and visiting motorists have been invited to drive up to the church, remain seated in their cars and participate in the services from the curbstone.

Nebraskan Clubs Hold Meetings—The annual meeting of the Nebraska Automobile Association will be held in Lincoln, Neb., the last week in November. The Knox County Automobile Association held its annual meeting at Bloomfield recently, electing officers and appointing delegates for the coming convention. Many new members were added to the rolls. O. C. Turner, secretary of the State Association, was present and gave an address on the State and National bodies and on good roads.

Hoosier Members' Police Power—Special police powers have recently been granted a number of members of the Hoosier Motor Club, Indianapolis, Ind., for the purpose of aiding the Police Department in enforcing the speed law. One evening recently, W. S. Gilbreath, secretary of the club, ran down and arrested Baird Brill, who was running at the rate of thirty miles an hour. In police court Gilbreath "made his case," Brill being fined $30 and costs. The regular schedule of fines for speed violators in the Indianapolis police court is $1 a mile up to the maximum of $50 provided by the law.

Studebaker cars laying out the Pasear tour at Jawbone Pass

Baseball team of Streator Motor Car Company, Streator, Ill.

National in New Quarters—The National Motor Car Company, Pittsburgh, Pa., has moved into its new showrooms at Baum and Beatty streets.

Sandell Gets Oakland Appointment—Herbert S. Sandell has been appointed retail sales manager of the new Oakland Philadelphia, Pa., branch, 506 North Broad street.

Goodrich Declares Quarterly Dividend—The B. F. Goodrich Company, Akron, O., declared its regular quarterly dividend of 1¾ per cent on the preferred stock, payable October 1.

Hatter Resigns from Velie—C. P. Hatter, assistant manager of the Velie Motor Vehicle Company, Moline, Ill., has resigned and is succeeded by George Fitzsimmons, formerly with the Thomas factory at Detroit, Mich.

To Build 11,500 Oaklands in 1913—The Oakland Motor Car Company, Pontiac, Mich., announces that the plans for next season call for the building of 11,500 Oakland cars, and that this will necessitate a number of factory additions.

Halladay's Baseball Team—The Halladay baseball team, composed of employees of the Streator Motor Car Company, Streator, Ill., recently closed a very successful season, having played 26 games, winning 21 and losing 5. The accompanying photograph shows the team.

Automobiles Yield Big Revenue—A $91,497.19 gain in state revenue over the corresponding period of the previous year is shown in the report of Commissioner of Motor Vehicles Lippincott, who has remitted $440,509.89 to the State Treasurer as against $358,012.71 over last year.

Lasher Joins Abbott-Detroit—William J. Lasher has just severed his connection as branch manager of the Carl H. Paige Company, New York City, handling the Chalmers, to join forces with the Abbott-Detroit Motor Company, New York City. He will in his new capacity have charge of the agency business.

Winning Cars Bosch Equipped—At the recent Light Car Grand Prix of France, arranged by the Automobile Club of Sarthe, Zuccarelli driving a Lion Peugeot car gained first place, being equipped with a Bosch magneto. In the race for the Sarthe Cup, Coupé de la Sarthe, Goux in a Peugeot gained first place, also equipped with a Bosch.

Wilby's Across-Canada Trip—Thomas W. Wilby of New York City, who last year made a 9000-mile automobile tour of the United States from the Atlantic to the Pacific and return, is this autumn undertaking the first motor tour ever attempted across Canada. The tour is made for the purpose of mapping out a Canadian highway from ocean to ocean.

Association Opens Twelfth Branch—The Automobile Service Association, a mutual service corporation launched about a year ago, the main offices of which are located at Fifty-second and Chestnut streets, recently opened its twelfth branch, at Lancaster, Pa. S. M. Waasus is president of the association and G. W. Carrington is vice-president and general manager.

Dwight President Iron Firm—John H. Dwight, manager of the motor car body and wagon departments of the Mitchell-Lewis Motor Company of Racine, Wis., has resigned to become president and general manager of the Belle City Malleable Iron Company of Racine, Wis., which does a large business in supplying motor car manufacturers with castings of all kinds. Mr. Dwight succeeds W. C. MacMahon, who has become vice-president and manager of the Northwestern Malleable Iron Company of Milwaukee.

Road Improvement in Amarillo—The fact that Amarillo, Tex., is on the motor car tourist route between points in Texas south and east of here and Denver, as well as on the route between Oklahoma and Kansas points and New Mexico and other points of the Southwest, has forced upon the people of this section of the Panhandle the necessity of improving the highways, and with this object in view steps have been taken by the chamber of commerce of Amarillo and other civic bodies of this part of the state to not only improve the existing roads but to construct others that will be devoted exclusively to motor car travel. Signboards and distance markers will be placed upon all of the main highways.

Automobile Incorporations

AUTOMOBILES AND PARTS

CINCINNATI, O.—Federal Motor Supply Company; capital, $250,000; to manufacture and sell all kinds of automobiles, parts and accessories. Incorporators: George W. Platt, Emil C. Schmitt, R. L. Dollings, A. M. Draddy, M. F. Platt.

DETROIT, MICH.—Traveler Motor Car Company; capital, $15,000; to manufacture automobiles and accessories. Incorporators: Wm. J. McIntyre, Joseph P. Lavergne, William L. Kenfield.

FLINT, MICH.—Sterling Motor Company; capital, $300,000; to manufacture automobile engines. Incorporator: W. C. Durant.

INDIANAPOLIS, IND.—Martin Tractor Company; capital, $350,000; to manufacture automobile tractors. Incorporators: C. H. Martin, H. R. Richarss, E. D. Moore.

JOHNSTOWN, PA.—United States Motor Sales Company; capital, $50,000; to manufacture motors. Incorporators: A. C. Simler, J. L. Simler, C. H. Raymond.

NEW YORK CITY, N. Y.—Motor and Gear Improvement Company; capital, $1,250,000; to manufacture automobile parts, etc. Incorporators: Henry C. Derham, S. V. Brady, Dwight Partridge.

ROCHESTER, N. Y.—Lamay Manufacturing Company; capital, $25,000; to manufacture motors, etc. Incorporators: Arthur B. Headley, Philip E. Tucker, Arthur C. Lamay.

TORONTO, CAN.—Standard Motors, Ltd.; capital, $40,000; to manufacture automobiles. Incorporators: George S. Skinner, Harry A. Newman, George P. McHugh.

GARAGES AND ACCESSORIES

ALBANY, N. Y.—Taxicab Transportation Company; capital, $5,000; to run a motor car business. Incorporators: William Hildebrant, Elizabeth Hildebrant, Elsa Hildebrant.

BALTIMORE, MD.—Automobile Tire Repairing Company; capital, $500; to carry on a tire repairing business. Incorporator: L. Vernon Iller.

BOSTON, MASS.—Motor Service Company; capital, $2,500; to carry on a motor service business. Incorporators: Sanford Small, Harold Chisholm, Williams H. Evans.

BUFFALO, N. Y.—Buffalo Resilio Company; capital, $25,000; to manufacture and deal in tire fillers. Incorporators: Stafford D. Noble, Alexander D. Falck, Philip E. Lonergan.

CLEVELAND, O.—Pioneer Gasoline Company; capital, $10,000; to deal in gasoline. Incorporator: Edward J. Cherney.

DALLAS, TEX.—Automobile Owners' Protective Association; capital, $25,000; to carry on a garage for the use of members of the association, and to give legal advice. Incorporator: O. H. Bettes.

DETROIT, MICH.—Motor Patents Company; capital, $10,000; to manufacture machinery and mechanical devices. Incorporators: John W. Dyar, Sherman L. Depew, Earl W. McGookin.

DETROIT, MICH.—General Castings Company; capital, $2,000; to manufacture castings. Incorporators: F. Walter Guibert, J. C. Eckliff, D. Fitzgerald.

DETROIT, MICH.—National Automobile Owners' Protective Association; capital, $2,000; for the purpose of protecting automobilists. Incorporators: H. Bertram St. Clair, Henry O. Sage, Elmer H. Beach.

INDIANAPOLIS, IND.—Glover Equipment Company; capital, $20,000; to manufacture automobile accessories. Incorporators: Frank L. Glover, Leonard Gieger, William A. Uphrey, Louis A. Libkings.

INDIANAPOLIS, IND.—Showlater Manufacturing Company; capital, $10,000; to manufacture automobile bodies, etc. Incorporators: H. G. and F. W. Showlater, William Small.

JACKSONVILLE, FLA.—Chalmers Motor Company; capital, $15,000; to deal in automobiles. Incorporators: C. L. Bagwell, Garland J. Bagwell, W. Parker Holmes.

Richmond Clubhouse Nearly Completed—Completion of the new clubhouse of the Richmond County Automobile Club, Richmond, N. Y., is expected in a few weeks.

Willman, Sales Manager Warren—G. L. Willman, formerly connected with the Board of Commerce, has been made sales manager of the Warren Motor Car Company, Detroit, Mich.

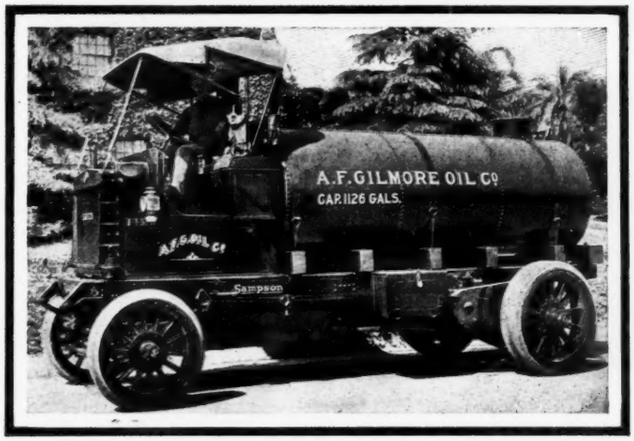
Clark Makes Cole Change—A change in the Cole Kansas City distribution house has taken place. H. J. Clark, who formerly worked for the Cole distributers in Kansas City, secures the distributing business.

Essenkay Opens Buffalo Salesroom—The Empire Essenkay Company, which concern was incorporated recently at Albany, N. Y., to deal in that city in automobiles, has opened a salesroom at 248 Washington avenue, Buffalo, N. Y.

Morgan Joins Machine Company—C. L. Morgan, formerly sales manager of the electric division of the General Motors Truck Company, has resigned to take a position with the Moon-Hopkins Billing Machine Company of St. Louis.

Speedwell San Francisco Branch—The Speedwell Motor Car Company, Dayton, O., has established a branch in San Francisco, Cal., taking over the interests of the Speedwell Motor Car Company of California. R. Harry Croninger is manager.

Trego With Packard Company—Frank H. Trego has returned to Detroit from Buffalo, where he was chief engineer of the E. R. Thomas Motor Car Company, to take charge of the department of research engineering for the Packard Motor Car Company.



Sampson truck displacing sixteen mules in Santa Monica, Cal.

Foster Company's New Men—The Foster Motor Sales Company, Detroit, Mich., State distributers for Cutting cars, has secured the services of T. E. Ball as sales manager. Two other automobile men, George H. Irvine and Edwin G. Galvin have recently taken positions with the Foster Company.

Russell Company's Annual Conference—The branch managers and salespeople of the Russell Motor Car Company, Toronto, Ont., held their annual conference last week at the West Toronto headquarters of that concern, sessions including demonstrations of the new Russell models and a conference on automobile business matters.

Sampson in Oil Service—One of the latest concerns to dispense with their mule-driven transportation system is the A. F. Gilmore Oil Company, Santa Monica, Cal., which supplies oil for road work from their wells in the Santa Monica district. The Gilmore Company has recently purchased a five-ton Sampson truck and has fitted it with a huge tank of 1,100 gallons capacity. The accompanying photograph shows the truck.

Holmes Resigns from Swinehart—C. E. Holmes, formerly of the Diamond Rubber Company, Goodyear Tire and Rubber Company, and the late Southern manager of the Swinehart Tire and Rubber Company, resigns his position on September 15 to enter into the retail tire and vulcanizing business in Birmingham, Ala. Mr. Holmes has traveled East and South, representing the above firms for the past eight years, and is quite well known with the automobile distributors.

Studebaker's New Detroit Quarters—On October 1 the Studebaker Corporation will take over the new garage and showroom at Woodward and Charlotte avenues, Detroit, Mich., now occupied by the United States Motor Company, the deal involving a consideration of about $100,000. The Studebaker interests will use the property as headquarters of a recently formed Detroit branch which is at present located at Studebaker Plant No. 1 on Piquette street. The new headquarters will be managed by A. K. McLundy, Michigan sales manager.

Kurtschora President Battery Company—Martin W. Kurtschora, for many years manager of the Beaver Manufacturing Company, manufacturer of motors, Milwaukee, Wis., has purchased the controlling interest in the Northwestern Storage Battery Company, of Milwaukee, and will assume the active management. Officers of the reorganized company are: President, Martin W. Kurtschora; vice-president, E. D. McLaughlin; secretary, F. E. Scudder; treasurer, William Jacobs. The new management is outlining a policy of immediate expansion.

Automobile Incorporations

MARIETTA, O.—Gerhart Spring Tire Company; capital, $15,000; to manufacture vehicle wheels of all kinds, including automobile tires. Incorporators: J. A. Gerhart, G. O. Salzman, Casper Hopp, O. C. Mohler, A. A. Schramm.

MARLINGTON, W. VA.—Marlington Garage Company; capital, $10,000; to carry on a garage business. Incorporators: F. T. McVlintic, C. A. Yeager, M. E. Pue, C. R. Goodall, L. S. Shoemaker, G. W. Clark.

MINNEAPOLIS, MINN.—O. Fenstermacher Company; capital, $300,000; to deal in automobile supplies. Incorporators: O. Fenstermacher, T. O. Fenstermacher, Fred Chambers.

MONTREAL, CAN.—Mount Royal Garage Company; capital, $500,000; to carry on a taxicab business. Incorporators: James A. Brooks, George Ross, Sen. F. L. Beique, F. A. Beique, L. J. Beique.

NEW YORK CITY, N. Y.—Miller, Hicks & Hewitt, Inc.; capital, $10,000; to go into the automobile business. Incorporators: Harry D. Miller, Henry T. Hicks, George A. Hewitt.

NEW YORK CITY, N. Y.—Cameron-Rowe Auto Service, Inc.; capital, $10,000; to conduct an automobile service business. Incorporators: James Cameron, Norman Cameron, August T. Rowe.

NEW YORK CITY, N. Y.—Mercedes Daimler Selling Corporation; capital, $50,000; to carry on an automobile business. Incorporators: A. M. Becker, John A. Lemline, E. H. Ferguson.

NEW YORK CITY, N. Y.—Hunt & West, Inc.; capital, $10,000; to carry on an automobile business. Incorporators: Burton R. Law, John W. Collopy, Elly Z. Parker.

NEW YORK CITY, N. Y.—Volkmar Manufacturing Company; capital, $100,000; to manufacture automatic starting devices for automobiles. Incorporators: William M. Giegerich, Edward Giegerich, Bernard Volkmar.

NEW YORK CITY, N. Y.—Auto Despatch Bureau, Inc.; capital, $25,000; to carry on an automobile business. Incorporators: Walter Stackhouse, Harold Parker, L. S. Parker.

PEORIA, ILL.—Jefferson Automobile Company; capital, $30,000; to manufacture, repair and deal in automobiles, and operate garage. Incorporators: R. C. Uckena, Frank E. Howland, F. I. Archdale, W. C. Rounneberg, Cederic Howland.

ROCHESTER, N. Y.—Automobile Safety Fender Company; capital, $100,000; to manufacture automobile fenders. Incorporators: William A. Snyder, Abram DeWolf, Abram Bune, William D. Elliott, Abraham DePotter.

SAN ANGELO, TEX.—S. L. Henderson Company; capital, $10,000; to deal in automobiles. Incorporators: S. L. Henderson, J. S. Allison, George S. Alleson.

WELLSBURG, W. VA.—Brooke Automobile Company; capital, $10,000; to deal in automobiles. Incorporators: J. H. Scott, C. M. Magee, P. A. Chapman.

ST. LOUIS, MO.—Lewis Automobile Company; capital, $26,000; to engage in the automobile and garage business. Incorporator: J. D. P. Lewis.

WELLSBURG, W. VA.—Brooks Auto Company; capital, $10,000; to deal in automobiles. Incorporators: J. H. Scott, W. H. Scott, C. M. Magee, F. A. Chapman, E. A Fegan.

CHANGES OF CAPITAL.

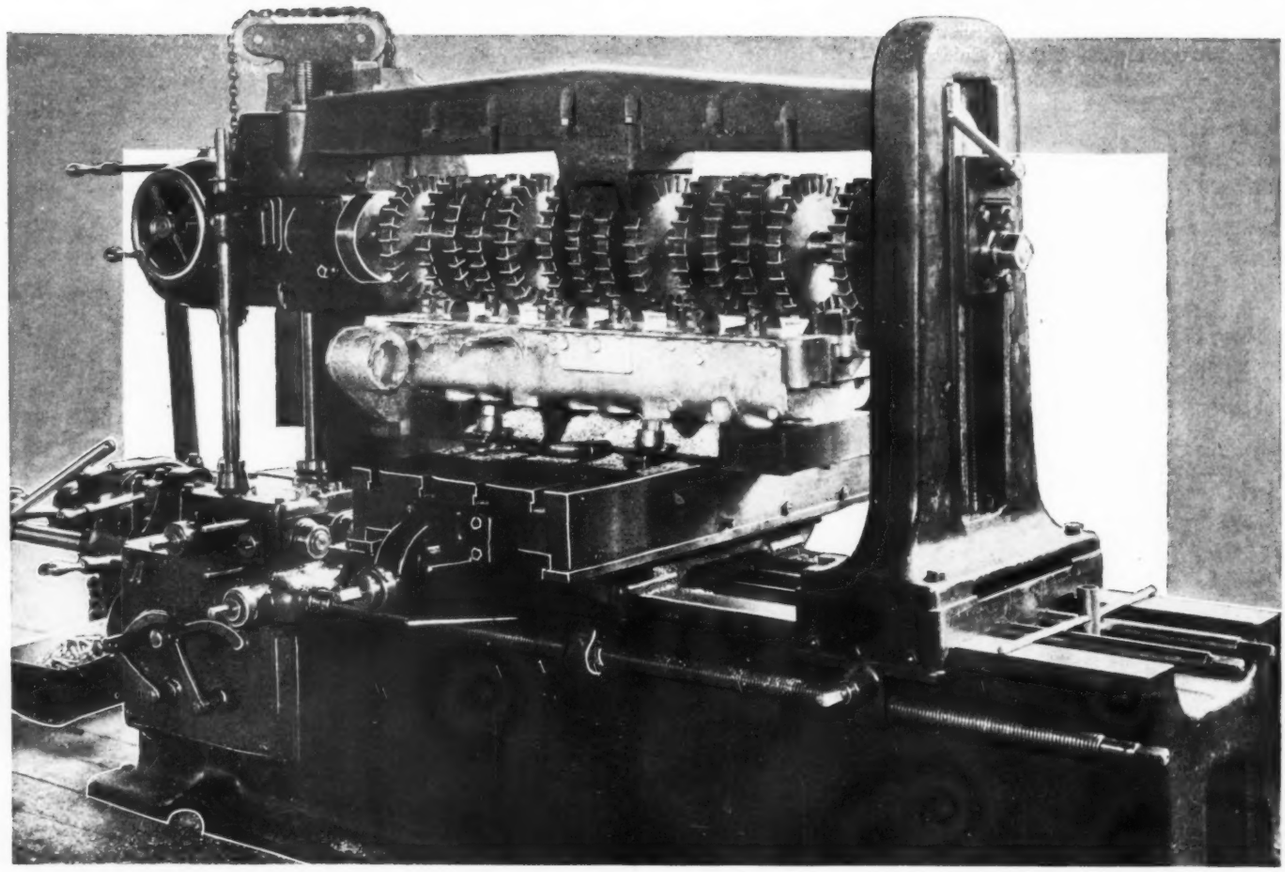
DETROIT, MICH.—Kelsey Wheel Company; increase of capital from $500,000 to $1,000,000.

DETROIT, MICH.—Detroit Socket Company; increase of capital from $40,000 to $75,000.

JACKSON, MICH.—Hayes Wheel Company; increase of capital from $100,000 to $300,000.

TOLEDO, O.—Hupp Motor Car Company; increase of capital from $500,000 to $750,000.

Factory Miscellany



Machine used for milling crankcases in the factory of the Peerless Motor Car Company, Cleveland, O. It mills a crankcase in 25 minutes

The machine depicted above accomplishes a large quantity of work in a very short space of time. It is used by the Peerless Motor Car Company in its factory at Cleveland, O., for milling crankcases. It will be remembered that the Peerless six-cylinder car has a seven-bearing crankshaft so it will be realized that the machine is accomplishing a large amount of work in completely finishing the milling work on one of these crankcases in approximately 25 minutes. The machine can work steadily during the working day of 10 hours and in that time will turn out 25 completed jobs. It requires but one man to run and take care of the machine. As will be noted from the above illustration, the milling of every part requiring this work is accomplished simultaneously. It is very easy to set the job up as the castings to be handled are of aluminum and consequently very light while the table carrying the work can readily be adjusted owing to its easily controlled mounting. The cost of operating this machine is low on account of the small wear on its parts, while performing the work and the fact that it requires but one man to operate it and to set up the work. One setting of the machine is all that is necessary for each job and when the piece is removed from the machine it is finished.

POPE COMPANY DOUBLES CAPACITY—The Pope Manufacturing Company, Hartford, Conn., has its plans nearly completed for a big four-story factory, to be erected to produce a line of lower priced cars. It is expected that this plant will double the capacity of the Pope plant. The accompanying photograph shows the Pope Manufacturing Company's proposed new building.

Packard Kansas Company's Plant—The Packard Kansas City Company, Kansas City, Mo., a subsidiary of the Packard Automobile Manufacturing Company, Detroit, Mich., will build a $30,000 plant at that city for repair works.

Ford Acquires Factory Site—The Ford Motor Company, Detroit, Mich., has acquired 51 acres of land adjacent to its branch plant at Walkersville, across the river from Detroit, with a view of permitting extensions to the plant.

Flanders Plant Enlarged—Extensive additions are now being made to the Flanders plant, Detroit, Mich., which when completed will more than double the floor space and bring up the output fom 3,500 cars in 1912 up to about 15,000 cars in 1913.

Olmstead Company Erects Additions—The Olmstead Traction Engine Company, Great Falls, Mont., which proposes to manufacture traction engines and automobile trucks, has made arrangements to erect two buildings. They are to be 50 by 200 feet in size and will be used for manufacturing purposes, while the other will be the office building.

Grand Rapids Company's Addition—The Page Automobile Hoist Company, Grand Rapids, Mich., is making negotiations with the common council for a lease of the old lighting plant on South Market avenue, which was abandoned when the city occupied its new lighting and water station on Monroe avenue. The business of the company has increased until it has been forced to seek more room.

General Vehicle's $600,000 Building—The General Vehicle has started a $600,000 plant in Long Island City, N. Y., which will form a unit of an extensive plant.

Croxton's Washington Plant—The Croxton Motor Car Company, Cleveland, O., is building a new plant at Washington, Pa., for the manufacture of automobiles.

Peteler Car Company's Building—The Peteler Car Company, St. Paul, Minn., is making arrangements preliminary to the building of a plant on a 23-acre tract recently acquired.

Negotiating for New Albany Plant—The Advance Power Company, Chicago, Ill., is negotiating for the plant of the American Automobile Corporation, New Albany, Ind.

Northway Plant Doubling Capacity—The Northway Motor & Manufacturing Company, Detroit, Mich., is preparing to double the capacity and to this end has awarded a contract for five new buildings.

Oakland to Build Factory Addition—A total of 300,000 square feet of space will be added to the factory of the Oakland Motor Car Company, Pontiac, Mich. These additions will be started at once.

Pontiac Firm's New Factory—The Pontiac Automobile Casting Company, Pontiac, Mich., has recently incorporated and has purchased a five-acre site and awarded a contract for the erection of a one-story building, 40 feet by 100 feet in size.

Hess Spring Company's Addition—The Hess-Pontiac Spring & Axle Company, Pontiac, Mich., maker of automobile springs, will build an addition, 62 by 54 feet, which with the addition now being completed, will double its present manufacturing capacity.

Whiting Company's Addition—The Whiting Manufacturing Company, Hartford, Conn., manufacturer of machine tools and automobile driving chains, is preparing plans for the erection of a two-story addition to its plant. It will be of steel and concrete construction.

Kissel Adds Two Buildings—The Kissel Motor Car Company, Hartford, Wis., recently added two commodious buildings to its plant at that city, and figured that the additional facilities thus provided would enable a less nerve-racking production schedule than that of last year.

Pierce Adding to Assembling Building—The Pierce-Arrow Car Company, Buffalo, N. Y., has awarded contracts for three additional stories to its truck assembling building. The size will be 184 feet by 244 feet, and one additional story will be added to each wing of its three-story body building, the sizes being 60 feet by 402 feet and 60 feet by 325 feet.

Julian Factory Under Way—Work has been started on the construction of the Julian Motor Company's new factory at Messina Springs, N. Y. A building site of 15 acres has been acquired and it is expected that the factory will be in operation by February 1, 1913. The company is comprised of Syracuse men who will put out the highest-priced motors in the country, for automobiles, boats and stationary work.

Peninsular Company Purchases Works—The Peninsular Steel Casting Company, recently formed by men of Detroit and Pontiac, Mich., to make lines of crucible steel castings that are in strong demand in the automobile industry, has purchased the former Michigan Bolt & Nut Works property in Detroit, Work of remodeling, building furnaces and installing equipment has begun and operations are expected to be started within 60 days.

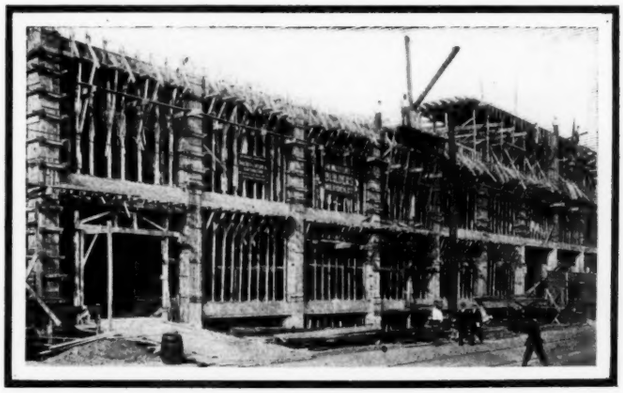
Remy Increases Factory Building—The Remy Electric Company, Anderson, Ind., has started the addition of two fire-proof buildings. The new buildings will give the Remy factory an increase of 10,600 additional square feet of floor space. They will be completed within three weeks. The factory is at present the largest of its kind in the world, employing over 1,000 men and working day and night shifts.

Motor Company Increases Capacity—The Milwaukee Motor Company, Thirty-second and Burleigh streets, Milwaukee, Wis., has completed additions and improvements which will increase its capacity by one-third. The company manufactures motors for pleasure cars and commercial vehicles, furnishing the power plants for all Imperial cars made at Jackson, Mich. More than $70,000 worth of new machinery and equipment has been installed during the summer months. The officers of the company are: President, E. E. Warner; vice-president, John D. Bowers; secretary and treasurer, Charles J. Kaiser.

Trabold Heads Johnstown Concern—Adam Trabold, who is one of the Johnstown, Pa., pioneers in the automobile business, is at the head of a new concern which has for its purpose the manufacture of high-grade trucks. Mr. Trabold has been working on the plans for such an institution for some time, but did not make his intention public until he was sure that a truck could be built that would stand up under the severe roads and heavy grades in that section, at a price that would be attractive to the purchaser of this class of vehicle. The first truck built was recently delivered to the Germania Brewing Company, of Johnstown.

Case Puchases Pierce Company—It is announced that the J. I. Case Threshing Machine Company of Racine, Wis., has purchased the stock, plant and rights of the Pierce Motor Company, of Racine, which has been building the Case car for the big farm machinery works for two years. The Pierce works will at once be consolidated with the immense Case works and lose its identity as a coporation. The change is simply one of name, as the principal stockholders in the Case company in July, 1910, purchased the entire stock issue of the Pierce company from A. J. Pierce, the noted motor designer, and his associates, at the same time that the Case company purchased the entire output of the Pierce works and began to market the cars under the trade name of Case. Thus the Pierce company has been for two years the property of the owners of the Case corporation.

New Fond du Lac Corporation—The R. C. Wells Manufacturing Company, a new corporation at Fond du Lac, Wis., has leased a large plant and will engage at once in the manufacture of electric lighting and starting systems for motor cars. The company virtually is the successor of the Duplex Coil Company, of Fond du Lac, Wis., which recently was purchased by the wealthy Rueping interests from E. J. Huber and his associates. R. C. Wells was the general manager of the concern, which manufactured coils, batteries, ignition devices and electric lighting systems for the motor car trade. The new corporation is capitalized at $200,000, the 2,000 shares being divided into 1,500 common and 500 preferred. The principal product will be an improved electric lighting system designed by Mr. Wells, although the production of all kinds of electrical devices will be continued.



View of the partially completed addition being made to the plant of the Pope Manufacturing Company, Hartford, Conn.

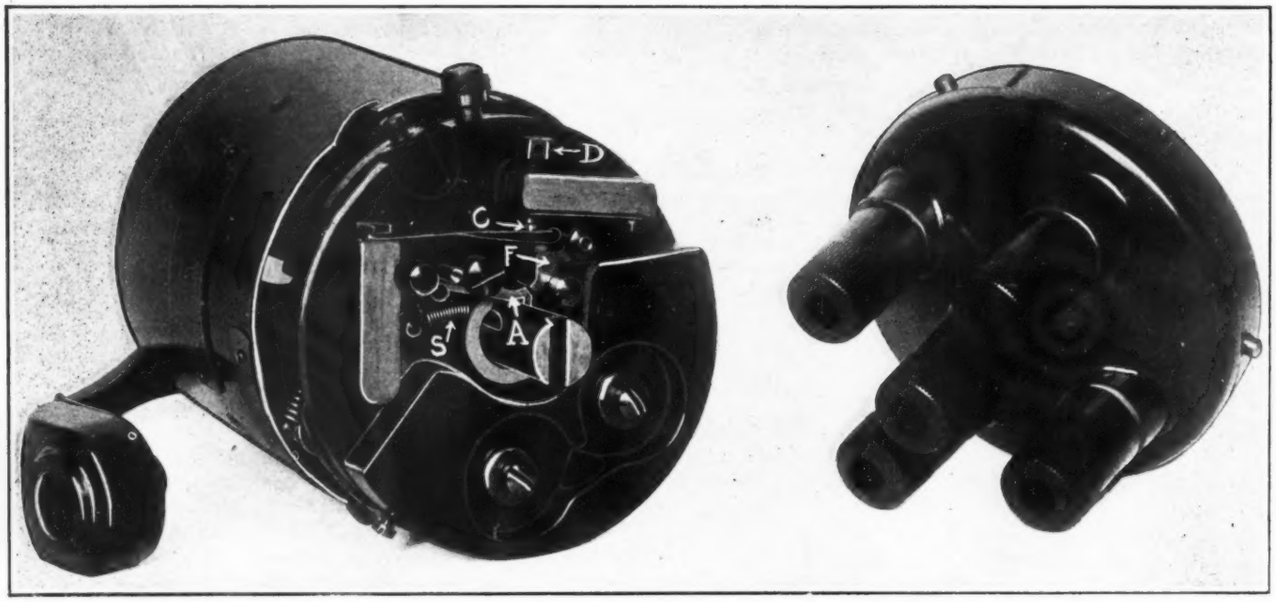


Fig. 1—Showing assembly of new Unisparker with rubber cover plate removed and details of the contact breaker mechanism

New Unisparker Has Automatic Advance

Improved Atwater-Kent Device Precludes Back Kicks—Is Silent in Operation

MODEL K Unisparker is now on the market. It is an improvement on its predecessor in that it embodies an automatic advance which makes it impossible for the motor to kick back when cranking. It is also more silent in its operation; the slight click which is made while making and breaking contact is hardly perceptible.

Realizing the increase in the use of the electric starting and lighting systems with the use of the storage battery for ignition, the Atwater Kent Manufacturing Works have turned their attention for the past three years to an instrument which would be of the utmost satisfaction when used with a battery ignition system. During the last seven years the former type of Unisparker has been on the market. It did not incorporate the automatic advance which is in the improved type but proved so popular that 75,000 of them have been sold during this time. With the introduction of the unique spark control and the added feature of silence the new system, according to the engineers of the Atwater Kent Company, has been brought to a state of perfection.

In appearance the device is cylindrical in shape and, when completely assembled, is of the form shown in Fig. 4. The casing is of pressed steel while the cover piece containing the binding posts is of hard rubber. It is mounted on a vertical shaft which is driven at half the speed of the crankshaft. Within the casing are contained the governor which automatically controls the advance, the circuit breaker and the high tension distributor.

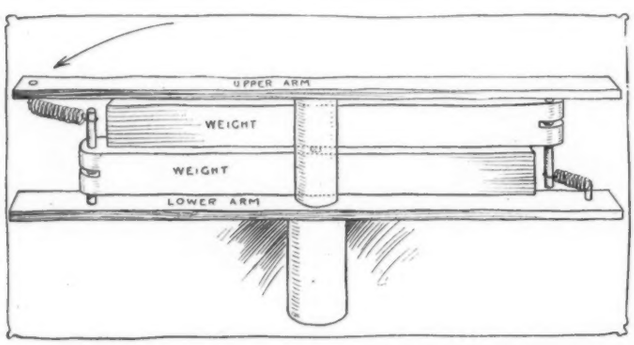


Fig. 2—Diagrammatic view, showing operation of automatic advance

The governor is a highly ingenious modification of the regular centrifugal type. The first feature which is noticeable is the complete balance of the revolving parts. The weights, arms and springs which compose the mechanism are symmetrically disposed and remain so regardless of the motor speed. The principle upon which the automatic advance operates is illustrated in the diagrammatic view in Fig. 2. The lower arm marked in the sketch is attached to the vertical half-time shaft and is solidly fixed in relation to this shaft. The upper arm is entirely independent of the lower arm and the vertical shaft to which the upper arm is attached fixedly is capable of turning independently of the lower arm. The upper shaft corresponds to the one which operates the circuit breaker so that it will readily be seen that the time at which the circuit is broken will be sooner or later in relation to the vertical half-time shaft's position according to the position of the upper arm in relation to lower arm.

Assuming the motor to be rotating the lower shaft in a clockwise direction when moving slowly there will be no relative motion between the two shafts. The upper and lower arms will be in the correct relative position to cause the circuit breaker and distributer to give a spark at the correct time for cranking the motor or for driving very slowly. When the motor is speeded up the tendency for the weights to fly away from the center of rotation becomes stronger and the weights move away from the axis of the half-time shaft.

There are two sets of these weights or four weights altogether, one set only being shown in the illustration for the sake of clearness. Each pair of weights is pivoted together at their centers. A cross sectional view as in Fig. 4, shows the pivots which join the weights A, more clearly. When the half-time shaft starts to revolve rapidly, the weights will fly away from the center and at the same time, being pivoted together will rotate in relation to each other, while the pivoted point moves directly away from the axis. Each weight will pull the arm to which it is connected away from the center of rotation and as the weights are connected to the arms on different sides of the center this will give a relative motion of the arms. Since the arms are connected rigidly to their respective shafts the positions of these shafts will change in respect to one another. In order that the

weights will not move away from the center too easily and give too great an advance at low speeds, the arms carry springs so arranged that the weights have to act against them when obeying the impulse of centrifugal force and moving away from the axis of rotation. Virtually each weight is a bell-crank lever with one point of connection at the point where it is pivotted to the arm and the other point of connection being where it is pivotted to the weight. The four weights thus give four bell-crank levers which work in the same direction at the same time against the four respective springs.

Referring to the sectional view of the governor in Fig. 4, the weights are shown at A, E is one of the springs connecting the lower arm B with the pivot pin holding one of the weights. B' is the upper arm and C, the connection to the half-time shaft of the motor. The distribution of the weights in the governor is shown plainly in the assembled view in the left side of Fig. 3. The slotted part shown in the illustration is the upper shaft which carries the circuit breaker and the distributer. The weights are labelled W1, W2, W3 and W4, in this view, while the springs are lettered S.

In Fig. 3, the governor and the circuit breaker are shown independently, while in Fig. 1 they are shown assembled. Referring first to Fig. 3 it will be noted that in the shaft with the slotted end there are four nearly crescent shaped indentations on the side of the shaft, one of which may be very plainly seen. The purpose of the indentations on the shaft is the operation of the circuit breaker through the trigger arm A in Fig. 1. As the shaft revolves, the trigger A in Fig. 1 or E in Fig. 4 engages with the slot in the shaft. As the shaft revolves it pulls the trigger with it against the spiral spring S, Fig. 1, or G, Fig. 4, until it has turned so far that the indentation in the end of the trigger no longer has a grip on the slot. The trigger is then released and snaps back, striking on its way the hammer F, Figs. 1 and 4. The hammer striking in turn against the contact spring C will bring the two contact points together and then permit them to fly apart with a make and break action so rapid that the eye can scarcely follow it. It will be noted that the stationary contact point is carried on a spring B instead of directly on the adjustment screw. The smallness of the moving parts and the short distances through which these parts travel reduce the noise to a slight click which is barely perceptible when the cover is on the device. As may be seen in Fig. 4, the wires are led through the casing A and connected to the interior binding posts on either side of the hole through which the wire enters. The current is led to the contact points from these binding posts through flat busbars which are insulated from each other and from the metal work on the interior of the box by hard-rubber and leather washers which are specially prepared to resist a high tension current.

Above the circuit breaker is the high tension distributer. This

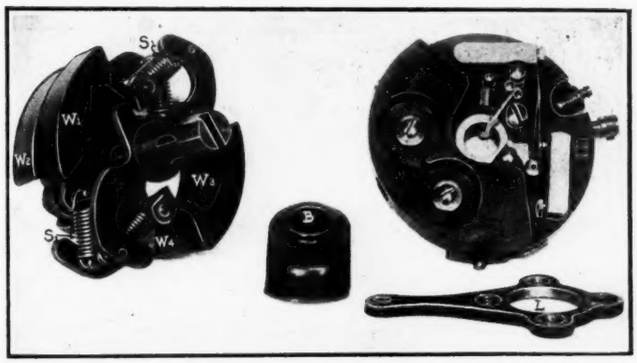


Fig. 3—Illustrating the centrifugal governor and circuit breaker

is shown in the foreground of Fig. 3 and again in Fig. 1. It is a hard rubber block which fits over the slotted shaft shown in Fig. 3. A key within the recess that contains the hard rubber shaft allows the block to become fixed to the shaft and rotate with it. The rubber block carries a segment of bronze which forms a wiping contact with the four distributer points embedded in the hard rubber cover. Each of these contact points is connected with a binding post from which a high tension cable is led directly to a spark-plug. There is no ground connection used rendering the entire system independent of other circuits such as that used for lighting or wiring systems, etc., should the latter become grounded.

One of the greatest advantages claimed by the makers for the Unisparker is that a perfectly synchronized multi-point ignition system may be installed by its use. It is claimed that the automatic advance is so regulated at the factory that two of these instruments could be used for the purpose of double ignition and that the resulting sparks would be simultaneous. The automatic advance feature does not interfere with the hand control of the spark but does in a measure render it useless except to an expert driver. There are very few drivers who carry the spark continually in the correct position. In driving through traffic for instance the speed of the vehicle is changing continuously and a driver has no opportunity to manipulate the spark to take care of every change of speed. For such an occasion the automatic advance is ideal. During the January meeting of the Society of Automobile Engineers in New York, the automatic advance was very thoroughly discussed and the advantages of the system in city work were clearly brought out. In country work, where the driver was not exceptionally skilled the difference in economy with the automatic and hand advance was little if any. With very skilful drivers greater economy was obtained with the hand control.

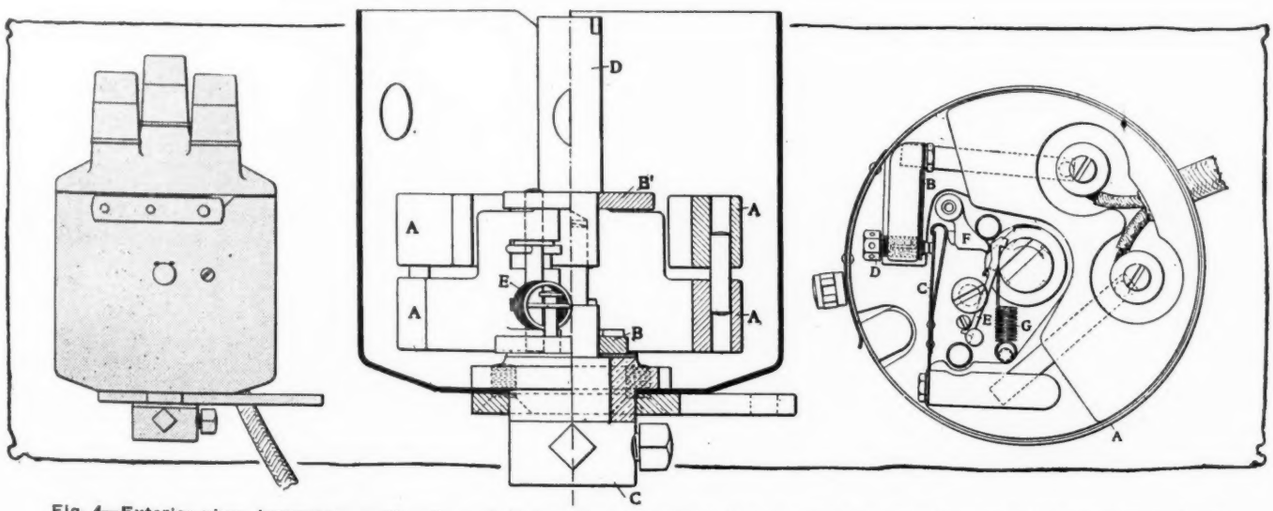


Fig. 4—Exterior view, transverse section through Unisparker assembly and plan view of circuit breaker with wiring connections

Rubber Glove for Steering Wheel; Tire Paint for Waterproofing Shoes; Cementless Inner Liner; Buggy Reach for Light Runabouts; Device for Turning Headlights in the Direction of Motion; Silver Plating Preparation

Steerease; a Rubber Wheel Grip

THE purpose of this article is to provide a good non-slipping grip on the steering wheel. It is made of rubber and slips over the rim of the wheel, being held in place by cement and its own elasticity and fit. This article, which is illustrated in Fig. 3, Steercase, replaces twine, rope and tape wrappings on the steering wheel and overcomes the principal objection to these, which are their unsightliness and the tendency of all windings of cord or rope to be tight on the inside of the steering wheel, but loose on the outside. The rubber used in the Steerease grip is moulded to the form of the steering wheel and does not require any preparation for putting it in place. It is simply slipped over the wheel and is then ready for use. The quality of the grip which it is possible to get on the wheel is better because the rubber is corrugated to such an extent that the hand cannot slip. A small flap on the rubber handle is left at each steering wheel spoke and as may be seen in the illustration the wheel grip is so designed that the ends of the spokes pass through the projections on the rubber giving a very neat and close fit all over the wheel. To apply Steerease, the steering wheel is thoroughly cleaned and dried to remove all moisture and grease from the surface. When thoroughly clean the Steerease is slipped over the wheel, adjusting the rubber neatly to shape and seeing that the edges fit closely together. The edges are then trimmed to conform to the spokes, should this be necessary, and then turn the edges back and apply the cement which accompanies the Steerease outfit. Allow the cement to spread as much as possible to secure a firm, solid grip and then wind with tape to hold the rubber in place. Let this stand over night, when the tape can be removed and the work is finished. Steerease is made by the Goodyear Rubber Hose and Parking Company, Philadelphia.

A New Preservative for Tires

Preserv-O is a tire paint packed in a cylindrical tin can with a friction cover. The can holds enough paint to cover six large tires. The object of the paint is to give a waterproof covering to the tire that will not only cover the exterior part of the casing, but will penetrate into the cuts and crevises, thus preventing water from working its way into the fabric and ruining the tire in a short space of time. The use of this paint will make the tires look like new, giving them a new white appearance. It is claimed by the makers that nothing is used in the paint that is not used in the manufacture of the tire itself. The preparation is made by the Atlas Auto Supply Company, of Chicago, Ill.

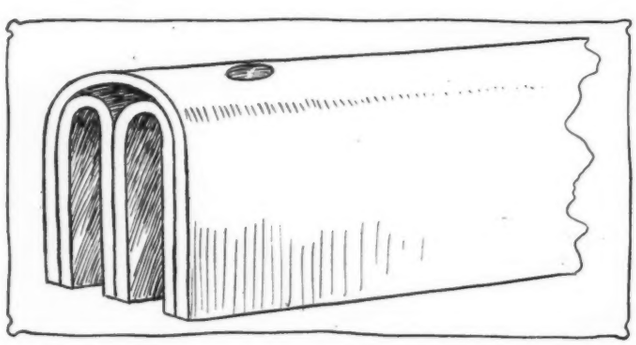


Fig. 1—A buggy reach suggested for use in light runabouts

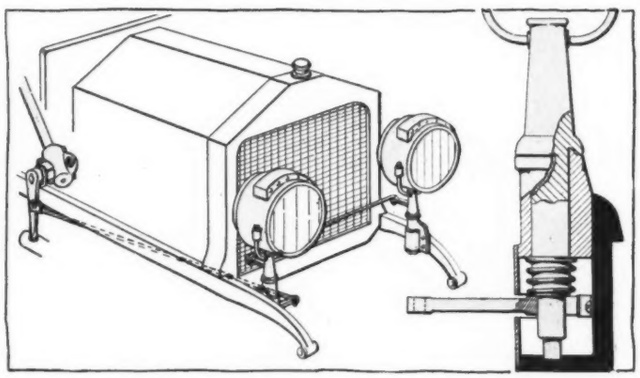


Fig. 2—Peters headlight turner interconnected with steering gear

Self-Vulcanizing Inner Liner

This is an inner liner which vulcanizes itself to the casing without the aid of any cement. It is made by Hagstrom Brothers Manufacturing Company, Lindsborg, Kan., who claim that a product of this kind has long been desired owing to the impossibility of getting the right kind of cement to fit the ordinary inner liner while on the road. A section of the inner liner is illustrated in Fig. 4. It is composed of four-ply, best quality Sea Island cotton thoroughly filled with raw rubber. There are no seams in the liner and special care is taken that there shall be nothing on its surface to chafe the inner tube. They are vulcanized at the factory to the exact shape of the tire and are given a soft cure. The adhesive property is given to the inner liner by a heavy coating of pure raw rubber cement which, it is stated, will positively not crumble or disintegrate under the stress of travel. The inner liner can be inserted on the road should the tire give evidence of being weak and will make the casing last for a sufficient length of time to carry the car through several hundred miles. It is applied by washing out the casing with gasoline and also the outer surface of the inner liner. When the gasoline on the latter has evaporated sufficiently to leave a sticky surface the liner is then gently inserted in the casing until it is flat against it around its entire surface. The flaps, which will be noted in the illustration, are then pulled out and passed around the bead of the shoe to be held by the clincher ring, thus preventing any tendency to creep.

A self-vulcanizing outside blow-out patch, which is also new on the market, is shown in the same illustration. This is put on

over the shoe where the blow-out has occurred and will vulcanize itself firmly to the shoe, forming a fixed support for the weakened spot and not permitting sand or water to work its way into the shoe and destroy its integrity. The application of the outside patch is taken care of in the same way as the inner liner. The outside of the shoe is thoroughly cleaned by washing with gasoline and the interior of the blow-out patch is rendered sticky by the same kind of treatment. The patch consists of the same material as the inner liner, being Sea Island cotton thoroughly impregnated with raw rubber. It is made heavier, however, to take care of the wear which will be imposed upon it while acting as the tread of the tire for the time being.

Bryant Steel Runabout Reach

A steel reach has been brought out by the Rochester Pressed Steel Company which is designed to replace the wooden reach or the steel reach with the metal filler. The material used in the reach, a section of which is shown in Fig. 1, is high carbon annealed steel of from 19 to 20 gauge. The advantages claimed for the reach are that it cannot rumble, will cost no more than second-growth hickory which has been properly ironed and that owing to the double U-section it is impossible for it to buckle under the stresses of ordinary running. The bolt holes in the reach are not drilled but are embossed or corrugated, forming a supporting wall for the bolt. The hole is punched so that no stock is removed in cutting the hole.

Automobile Headlight Turner

This is a device for turning the headlights in the direction that the car is tending to go for the purpose of examining the state of the road on that side of the car. Ordinarily the rays of light which are thrown out by the parabolic headlight reflector do not permit of the illumination of the roadside and as a result when a turn is made the car is forced to traverse a dark stretch of ground which may be full of holes, broken bottles or any of the other perils of the road. The lamps are mounted on brackets which in form are similar to the ordinary brackets used on the stationary light. As illustrated in Fig. 2, the upright posts are pivoted and held in their correct positions by spiral springs which also check vibrations and permit no noise to emanate from this source. The interior construction of the bracket is shown in the sectional view. The main standard consists of a casting, bolted rigidly to the frame, within which the movable spindle, which supports the lamp fork, is pivoted. A spiral spring holds the spindle down in contact with a dust-proof bearing at the top of the stationary bracket, bearing against the shoulder on the spindle. Below the sprong, which is seated on its lower portion against a strap iron bracket, the spindle shank is square, and arms are disposed thereon. These arms extend behind the column and are connected by a tie rod. To one of the brackets is attached an additional control arm, which is connected by means of another rod to the steering arm, as shown in the illustration. All working parts with the exception of the two rods just mentioned are concealed and out of the way. H. D. Peters, of Sioux Falls, S. D., is the inventor.

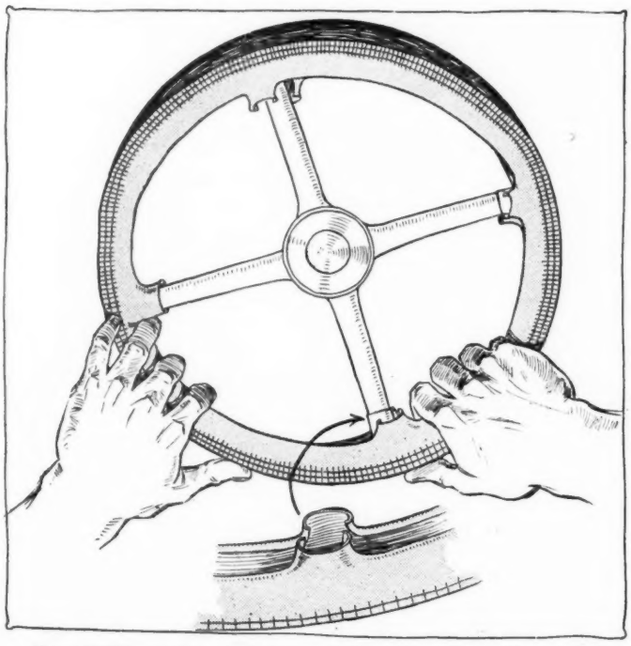


Fig. 3—Method of applying Steerease for securing a safe grip

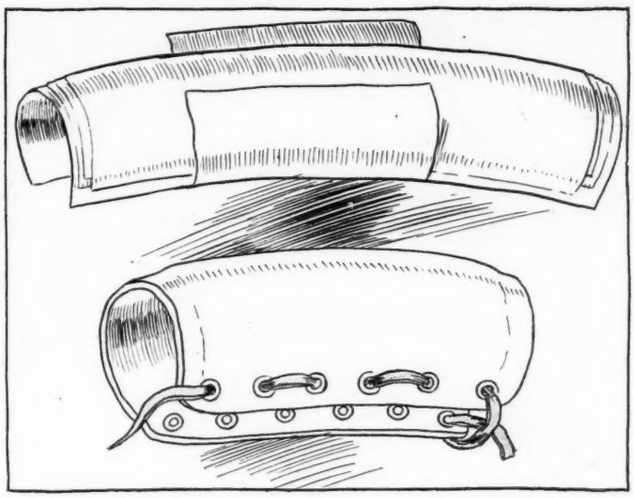


Fig. 4—Section of Hagstrom inner liner and outside blowout patch

Silver-Quick for Silver Plating

One rub with this material will silverplate brass or copper. Silver-Quick is a milky liquid put up in bottles holding about one pint. It has a smell similar to that of most metal polishes employing whiting as a base. To use Silver-Quick the article to be polished should be cleaned thoroughly and wiped dry. The bottle containing the preparation should be shaken to thoroughly mix the ingredients, which are held in suspension. A piece of cheesecloth is then saturated with the solution and rubbed on the surface of the article to be plated. Although it generally requires but little rubbing before the desired polish will be given the article, the application of the preparation should be continued until the entire surface has reached the desired polish. There will be a white deposit left after Silver-Quick has been used on a metal and this must be removed immediately with a dry cloth. After a week it would be well to replate the metal as this puts a thicker coat on the brass or copper and renders it more easy to take care of. After the metal becomes tarnished Silver-Quick can be used as a polish. This is one of the Atlas Auto Supply Company's products. This concern is located in Chicago.

Twentieth Century Tire Protector

An improved Twentieth Century tire protector has been brought out and called by the 20th Century Tire Protector Company, of Midlothian, Texas., the model 1913. It is of leather with a heavily studded tread. Its construction is of one-ply of chrome tanned leather which covers the casing from clincher bead to clincher bead. On the center of the protector is placed a tread which is built entirely independent of the body of the protector itself. It consists of two plies of imported Swiss leather tanned by a process which permits it to remain pliable after exposure to dampness. This tread is studded with hardened steel rivets which pass through the two thicknesses of leather on the tread and are clinched on the under side by a machine which presses the two prongs on the rivets far enough into the leather to make it perfectly smooth. The Swiss leather tread is attached to the main body by two rows of rivets.

CARBURETER Construction—In which the unit controlling the air-flow consists of a funnel-shaped tube fitting into the mixing chamber port.

The carbureter described in this patent, Fig. 1, is of the float-feed type. The gasoline enters at G and passes through the float chamber inclosed in the container shell C to the air-controlling unit, which comprises, principally, a tubular shell S fitting into a central passage leading from the lower portion of the carbureter container into the mixing chamber. The shell is formed with a downward flaring portion fitting into the central passage mentioned above, while the upper portion of the shell, which is of lesser diameter than the flaring one, is surrounded by a retaining ring R. To hold the shell securely in position relative to the ring R a coiled spring S1 is interposed between them. Throttles T and T1 serve to regulate the amount of mixture supplied by the carbureter to the motor.

No. 1,037,834—to John W. Raymond, assignor to the Air Friction Carbureter Company, Dayton, O. Granted September 3, 1912; filed October 9, 1911.

Self-Contained Spark-Plug—In the interior of which a high-tension vibrating coil is located.

The spark-plug, Fig. 2, described in this patent comprises a moistureproof case portion C in which a spark coil C1 and condenser are contained, which are connected to the outside of the casing, permitting of wiring the plug to a battery. A cap C2 closing the coil case carries a vibrator V which may be connected to the coil makes a tight, frictional fit with the case C. The lower portion of the plug case is fitted with sparking electrodes.

No. 1,036,760—to Ernest V. Wilcox and Burton L. Lawton, assignors to the Connecticut Telephone & Electric Company, Meriden, Conn. Granted August 27, 1912; filed November 11, 1911.

Force-Feed Lubricator—In which a semi-rotary pump casing makes communication between oil outlets and inlets of the lubricator.

Fig. 3 shows the lubricator referred to in this patent, which consists of a fixed member F having a circular series of alternately arranged oil inlet and outlet ports and of a semi-rotary casing C which bears on the part F and carries a circular series of pump barrels. At the lower ends of the latter are ports which register in turn with inlet and outlet ports of the fixed part F. Pistons are moving in the pump barrels, which are reciprocated at the same time as the pump casing C is imparted a semi-rotary movement.

No. 1,036,929—to Hjalmar A. Swanson, Chicago, Ill. Granted August 27, 1912; filed December 1, 1911.

Motor Lubrication System—In which the overflow of oil is passed from the crankcase through a relief valve to the cylinder walls.

The method of lubricating a hydrocarbon motor described in this patent comprises the use of means for feeding oil under pressure to the crankshaft bearings and of a relief valve in this oil lead. The oil passing the relief valve is delivered to the interior of the motor cylinders and lubricates the pistons.

No. 1,036,756—to Sidney D. Waldon, assignor to the Packard Motor Car Company, Detroit, Mich. Granted August 27, 1912; filed June 16, 1912.

Automobile Engine Starter—In which the engine is cranked through a system of gears.

This patent refers to an automobile engine starter and consists of a starting shaft which may be moved longitudinally and rotated, being adapted to be engaged with the crankshaft by a clutch member. A gear is mounted on the starting shaft, being in mesh with a second gear mounted on a second shaft. On the latter shaft is also mounted a third gear wheel by means of a feather and spline connection. This gear is capable of being engaged with or disengaged from the second gear mentioned, means being provided for this purpose. Other means serve for imparting longitudinal movement to the starting shaft, whereby it is engaged to the clutch member of the crankshaft. On the second shaft mentioned above a ratchet connection is mounted by means of which intermittent rotary motion may be imparted to the shaft.

No. 1,038,286—to Edward M. Card, Bridgeport, Conn. Granted September 10, 1912; filed September 5, 1911.

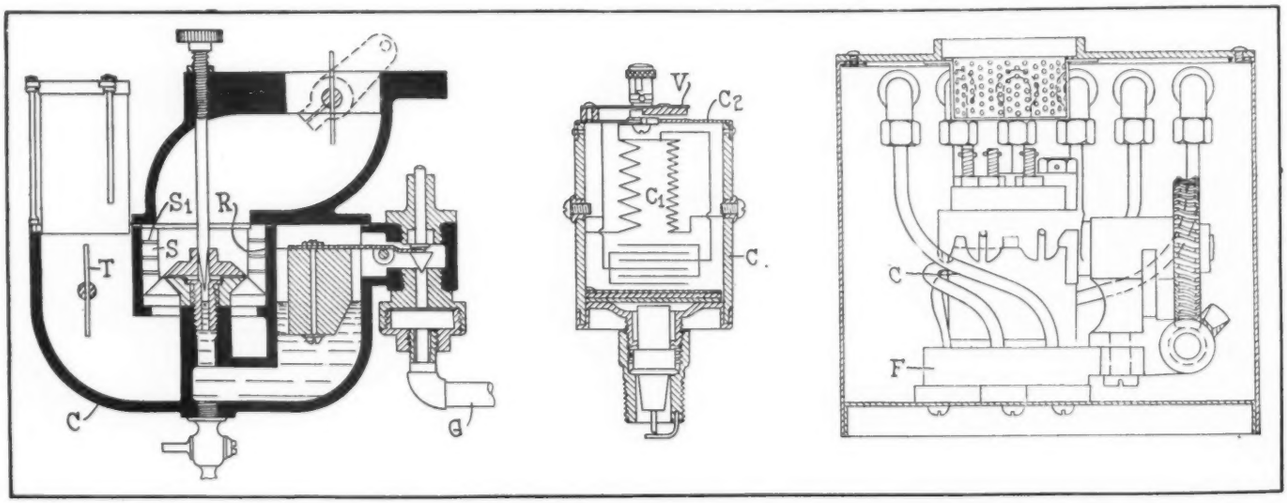


Fig. 1—Raymond automobile carbureter. Fig. 2—Wilcox-Lawton spark-plug. Fig. 3—Swanson force-feed lubricator